



**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**

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NMFS Tracking  
No.: 2003/00452

August 21, 2003

Wallace Reid  
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Region 10 ECL-115  
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Seattle, Washington 98101-1128

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Hylebos Waterways Segments 3, 4, and 5 Removal and Slip 1 Confined Disposal Facility Action, Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington

Dear Mr. Reid:

In accordance with Section 7 of the Endangered Species Act (ESA), as amended (16 U.S.C. 1531 *et seq.*) and the Magnuson Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996, the attached document transmits NOAA's National Marine Fisheries Service (NOAA Fisheries) Biological Opinion (Opinion) and MSA consultation on the Superfund removal action of Hylebos Waterway Segments 3, 4, and 5 and confined disposal in Slip 1 within Commencement Bay in Pierce County, Washington. The United States Environmental Protection Agency (EPA) had determined that the proposed action may affect, and is likely to adversely affect, the Puget Sound (PS) chinook (*Oncorhynchus tshawytscha*) Evolutionarily Significant Units.

This Opinion reflects the results of a formal ESA consultation and contains an analysis of effects covering PS chinook in Commencement Bay, Washington. The Opinion is based on information provided in the Biological Assessment sent to NOAA Fisheries by the EPA, and additional information transmitted via meetings, telephone conversations, fax and electronic mail. A complete administrative record of this consultation is on file at the Washington Habitat Branch Office. NOAA Fisheries concludes that implementation of the proposed project is not likely to jeopardize the continued existence of PS chinook. In your review, please note that the incidental take statement, which includes Reasonable and Prudent Measures and Terms and Conditions, were designed to minimize incidental take.



The MSA consultation concluded that the proposed project may adversely impact designated Essential Fish Habitat (EFH) for chinook and other estuarine species. The Reasonable and Prudent Measures of the ESA consultation, and Terms and Conditions identified therein, would address the negative effects from the proposed EPA actions. Therefore, NOAA Fisheries recommends that they be incorporated as EFH conservation measures.

If you have any questions, please contact Robert Clark at (206) 526-4338 or via electronic mail at [robert.clark@noaa.gov](mailto:robert.clark@noaa.gov).

Sincerely,

*for Michael R. Crouse*

D. Robert Lohn  
Regional Administrator

Enclosure

Endangered Species Act - Section 7 Consultation  
Biological Opinion  
and  
Magnuson-Stevens Fishery Conservation and Management Act  
Essential Fish Habitat Consultation

NMFS Tracking No.: 2003/00452

Hylebos Waterway Segments 1, 3, 4 and 5 Remediation and  
Slip 1 Confined Disposal Facility Action  
Commencement Bay Nearshore/Tideflats  
Superfund Site, Tacoma, Washington

Agency: Environmental Protection Agency

Consultation Conducted By: National Marine Fisheries Service  
Northwest Region

Issued by:

*for Michael R Couse*

Date: August 21, 2003

D. Robert Lohn  
Regional Administrator

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## 1.0 INTRODUCTION

### 1.1 Background and Consultation History

On April 22, 2003, the NOAA's National Marine Fisheries Service (NOAA Fisheries) received from the United States Environmental Protection Agency (EPA) a Biological Assessment (BA; July 2000), an Addendum (BA Addendum; February 2003), an Essential Fish Habitat (EFH) Assessment (February 2003), a 100 Percent Design Analysis Report (March 14, 2003), and a request for consultation under the Endangered Species Act (ESA) Section 7, and the Magnuson-Stevens Fishery Conservation and Management Act (MSA). Formal ESA consultation was initiated on April 22, 2003, because the EPA concluded that, while it may be difficult to quantify demonstrable impacts to listed resources by their proposed action, described below, the conservative position must be taken that the proposed activities are likely to have short-term adverse effects to the Puget Sound chinook (*Oncorhynchus tshawytscha*) Evolutionarily Significant Unit (ESU).

The EPA, under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) issued a consent decree to the Occidental Chemical Corporation (OCC) and the Port of Tacoma (the Port) to remove and/or cap contaminated sediments from the Hylebos Waterway (Superfund Segments 1, 3, 4, and 5) and dispose of contaminated sediments in the Blair Waterway Slip 1 Confined Disposal Facility (CDF). Dredged materials acceptable under the Puget Sound Dredged Disposal Analysis (PSDDA) program will be disposed of in the Commencement Bay open-water disposal site. Offsetting mitigation for this action involves the completion of the Phase II of the Blair Waterway Slip 5 Mitigation Project. The purpose of this CERCLA Remedial Action is to address unacceptable risks to the environment and public health from the contaminated sediments. The EPA's removal order to OCC and the Port is considered a Federal action under ESA. The proposed project occurs within the habitat of Puget Sound chinook, specifically in the marine waters of Water Resources Inventory Area (WRIA) 10.

In this CERCLA cleanup, the contaminated sediments are located in the Hylebos Waterway extending from the outer banks of the waterway, through the mouth, south roughly two-thirds the length of the outer waterway. The Hylebos Waterway, the site of the proposed contaminated sediment dredging project, and Blair Waterway Slip 1, the site of the proposed disposal site of the sediments, and Blair Waterway Slip 5, the site of the proposed mitigation site, are located within the industrial tideflats area of Commencement Bay, Tacoma, Washington. The proposed action will replace highly contaminated intertidal and subtidal sediments with chemically-clean relic deltatic substrates or confining caps. NOAA Fisheries concurs with the EPA effect determination of Likely to Adversely Affect.

The objective of the ESA consultation is to produce a Biological Opinion (Opinion) indicating whether the proposed action is likely to jeopardize the continued existence of Puget Sound chinook.

The objective of NOAA Fisheries' EFH consultation is to determine effects of Federal actions to habitat of regulated fish and recommend measures that may address detrimental effects, pursuant to section 305(b) of the MSA, and its implementing regulations found at 50 CFR 600. The EPA concluded their actions will benefit EFH by the long-term removal or capping of contaminated sediments with only minor short-term construction impacts, when their proposed conservation measures are applied. Both the Opinion and the EFH consultation are based on information provided in the original BA (EPA 2000a), the BA Addendum, meetings, mail correspondence, electronic mail (e-mail) correspondence, and phone conversations, which are contained in the Administrative Record.

The various remedial elements to occur as part of the proposed Action and covered by this Opinion include:

- Dredging of channel sediments from the Mouth of Hylebos Waterway (Segment 5) that are suitable for disposal at the PSSDDA Commencement Bay open-water disposal site,
- Dredging of channel sediments (Segment 5) from the Mouth of Hylebos Waterway for disposal in the Slip 1 CDF,
- Dredging of channel slope, and embankment sediments (Segments 3 and 4) in the middle of the Hylebos Waterway for disposal in the Slip 1 CDF,
- Capping of sediments along the shorelines/nearshore of Hylebos Waterway (Segment 4),
- Potential capping below Pier 24 and 25 Finger Piers,
- Capping of the Pier 25 Embankment,
- Pilot capping of the Pioneer/Occidental Embankment,
- Capping of the Pioneer/Occidental Embankment,
- Natural recovery of the U.S. Navy Bank,
- Natural recovery areas within Segments 1 and 4,
- Dredging/excavation of the Parcel 4 Embankment,
- Dredging and natural recovery within the Chinook Marina,
- Filling, capping and upland improvements at the Slip 1 CDF, and
- Slip 5 Mitigation Site construction (Phase II) including completion of the reef and placement of clean sandy dredged material above elevation minus 10 feet mean lower low water (MLLW), extension of the Pier 1D Beach, and placement of select substrate and large woody debris (LWD) above plus 8 feet MLLW.

It is appropriate to note that all pier and building removal activities to occur in Slip 5 will be completed as part of the Port's upcoming Terminal 3/4 Northern Expansion Project. Therefore, removal of Pier 1D, Pier 5, and a pile-supported building will be addressed in the forthcoming Biological Evaluation being prepared for the modified Terminal 3/4 Northern Expansion Project (Grette Associates, 2003.) and should be referenced for that information (Table 1). Also, relocation of the 0.29-acre Slip 1 Mitigation Beach and placing material over a portion of the existing

mitigation beaches within Slip 5 (the “Overlap Area”) will be included in the permit application for the Terminal 3/4 Northern Expansion Project (Grette Associates, 2003).

Table 1. Summary of NOAA Fisheries ESA Consultative Activities

Project Element	NOAA Fisheries/Documentation
Clear Creek Habitat Improvement Project - Phase II	WHB-02-118
Slip 1 Pier 1 and Pier 2 Demolition	2002/00847
Area 5106 Removal Action (dredging and disposal)	2002/00878
Slip 1 Berm Construction - Phases I and II	2002/00943
Slip 5 Habitat Site Construction - Phase I	2002/01112
Hylebos Waterway Segment 5 Dredging for PSDDA Disposal	This Opinion
Hylebos Waterway Segment 5 Dredging for Slip 1 Disposal	This Opinion
Hylebos Waterway Segments 3 and 4 Dredging for Slip 1 Disposal	This Opinion
Hylebos Waterway Segment 4 Shoreline/Nearshore Capping	This Opinion
Capping Under Finger Piers 24 and 25	This Opinion
Capping Pier 25 Embankment	This Opinion
Pilot Capping of Pier 25 Embankment	This Opinion
Natural Recovery of U.S. Navy Bank	This Opinion
Natural Recovery Areas within Segments 1 and 4	This Opinion
Dredging/Excavation of Parcel 4 Embankment	This Opinion
Dredging and Natural Recovery within the Chinook Marina	This Opinion
Slip 1 CDF Fill	This Opinion
Excess Capacity Sediment Disposal in Slip 1	
Middle Waterway Dredging for Slip 1 Disposal	2003/00574
Diagonal/Duwamish Sediment Remediation for Slip 1 Disposal	2002/01376
Slip 5 Habitat Site Construction - Phase II	This Opinion
Extension of Pier 1D Beach	
Upper Slope Substrate Modification	
Terminal 3/4 Northern Expansion and Trestle	WSB-01-501
Removal of Pier 1D and Pier 5 from Slip 5	
Removal of Pile-supported Building from Slip 5	

As originally envisioned, the filling of Slip 1 was to be completed in conjunction with a Port development project (the Terminal 3/4 Northern Expansion Project). The original BA prepared

for that Project, as revised in 2001 (Pacific International Engineering, August 16, 2000, Revised October 2001a), addressed the potential habitat impacts associated with construction of the containment berm, filling Slip 1 with clean dredged material, and constructing the proposed mitigation action within Slip 5. However, subsequent to the final decision that Slip 1 would be used as a CDF, the Port and OCC had incorporated Slip 1 fill, in its entirety, into this BA Addendum for completion and ease of reference.

Further, it should be noted that discrete portions of Slip 1 CDF construction are already underway. Work within Slip 1 that has already received the EPA approval and is scheduled to be completed during the 2002/2003 and/or 2003/2004 in-water construction seasons includes: (1) demolition of Piers 1 and 2 within Slip 1; (2) dredging of the Slip 1 berm stabilization key trench; (3) construction of the Slip 1 containment berm, including filling the berm stabilization key, placement of temporary buttress fill at the base of the berm, and erecting the containment berm to plus 16 feet MLLW; and (4) disposal of treated Area 5106 sediments within the Slip 1 CDF. These construction activities have already undergone ESA consultation and are not addressed as part of this Opinion (Table 1).

In addition, Phase I of Slip 5 Habitat construction has undergone ESA consultation, received the EPA approval, and is currently under construction. Thus, this Opinion only addresses construction activities associated with Phase II construction within Slip 5 (most fill placement to occur above minus 10 feet MLLW). Further, as described above, habitat benefits and work associated with removal of Pier 5, Pier 1D and an existing pile supported building from within Slip 5, relocation of the 0.29-acre Slip 1 Mitigation Beach to Slip 5 and placement of select substrates in the "Overlap Area" will be included in the forthcoming Biological Evaluation prepared for the Port's Terminal 3/4 Northern Expansion Project (Grette Associates, 2003) and should be referenced for this information.

## **1.2 Description of the Proposed Action**

The EPA proposes under CERCLA authority to approve the Port and OCC's activities to remove and/or cap sediment in Segments 1, 3, 4, and 5 of the Hylebos Waterway, fill and complete Slip 1 CDF, and complete Phase II of the Slip 5 Mitigation Site (Figure 1). Dredged material will be disposed of in either the Slip 1 CDF or at the PSDDA Commencement Bay open-water disposal site. The EPA's CERCLA remedial action has several discrete but integrated projects or elements which are the subject of this Opinion and described in the following sections.

### **1.2.1 Dredging of Sediments for Disposal at the PSDDA Open-Water Site**

A portion of the subtidal bottom sediments within the mouth of the Hylebos Waterway are suitable for disposal in 2003/04 at the PSDDA open-water disposal site. Bottom sediment within this area consist of fine-grained materials (silts, clays, and fine sands), all located below

elevation minus 10 feet MLLW. Approximately 17.25 acres of subtidal habitat will be dredged as part of this Project component. Approximately 179,900 cubic yards of channel sediments to be dredged within the mouth of Hylebos Waterway (including a 10% contingency) have been determined by the Dredged Material Management Program (DMMP) to be chemically suitable for placement at the Commencement Bay unconfined, PSDDA open-water disposal site (DMMP 2001).

The Port and OCC will dredge using a barge-mounted crane with a clamshell bucket. They will load dredged material onto a split-hull barge and transport it to the PSDDA open-water disposal site. The design dredge depths correspond to the elevation of native (clean) sediment within the Hylebos Waterway, while a two-to-one (horizontal length to vertical height) slope represents the long-term stable slope for waterway sediments. The design approach developed for this Project will ensure that the slope will not slump, so that there will be no conversion of littoral habitat to subtidal habitat.

Dredging within the mouth of the Hylebos Waterway for PSDDA disposal is expected to take approximately seven and one half months (Hart Crowser and Berger/ABAM 2003a). To reduce the risk of dredging adjacent boundary sediments, a PSDDA Dredged Material Management Unit will only be dredged if the abutting Sediment Management Area (SMA) has been previously dredged. The Port and OCC will dredge in the Mouth of the Hylebos Waterway after July 16, 2003 up through February 29, 2004. This in-water work window allows construction flexibility for the Segment 5 Contractor by allowing PSDDA dredging and disposal to continue during periods when Slip 1 may be otherwise unavailable.

### 1.2.2 Dredging of Sediments for Disposal in the Slip 1 CDF in Segment 5

The subtidal bottom sediments within the mouth of Hylebos Waterway Cleanup Area that are not suitable for disposal at the PSDDA open-water disposal site are slated for dredging and disposal within the Slip 1 CDF in 2003/04 (Figure 2). Bottom sediment within this area consist of fine-grained materials (silts, clays, and fine sands), all located below elevation minus 10 feet MLLW. Based on the 100 Percent Design Analysis Report (Hart Crowser and Berger/ABAM 2003a), approximately 299,800 cubic yards of Segment 5 sediments require disposal in the Slip 1 CDF. Chemical constituents exceeding Sediment Quality Objectives (SQO) criteria within this area include metals, semivolatile organics, and polychlorinated biphenyls (PCBs).

The Port and OCC will dredge approximately 299,800 cubic yards of sediment over 24.84 acres of subtidal habitat by clamshell bucket, and load the dredged material onto a split-hull and/or flat deck barge for transport to the Slip 1 CDF. Material will be placed in Slip 1 by barge dump or, once the berm crest has been constructed to an elevation that prohibits entrance of scows, sediment will be placed in the CDF using rehandling methods.

Dredging near existing slopes (with the exception of Parcel 4 and areas adjacent to piers) will continue the existing slope from minus 10 feet MLLW at an angle of two-to-one down to the design dredge elevations. The design dredge depths are intended ensure the stability of slopes and structures and to avoid slumping that would convert littoral habitat to deeper subtidal habitat. In areas adjacent to existing piers, excavation of the two-to-one slope will be offset 5 feet from the pierhead line to protect the integrity of the structures.

The Port and OCC have agreed to a conservative dredging starting date (August 16) for dredging of the most contaminated sediments slated for Slip 1 disposal to limit the potential for releases of constituents of concern during periods when juvenile salmonids are present. However, the concentrations of chemicals of concern varies widely in Segment 5 with some areas exhibiting levels that are only marginally above SQO criteria and very similar to PSDDA Screening Levels. On dredging projects where PSDDA standards are met, the Services have been approving a construction start date of July 16. Therefore, to alleviate potential scheduling conflicts, the Port and OCC propose that a dredging start date of July 16 apply to selected SMAs with low concentrations of constituents of concern. This start date allows construction flexibility for the Segment 5 Contractor, by limiting the potential for water quality or logistical constraints at Slip 1 to dictate dredging rates.

Overall, this project component does not include work (either directly or indirectly through slumping) on the existing side slopes above elevation minus 10 feet MLLW. Thus, no littoral habitat will be disturbed by dredging as part of this project component. Dredging above minus 10 feet MLLW has been avoided as a protective measure for salmonid habitat consistent with the intent of the Commencement Bay/Nearshore Tideflats (CB/NT) Explanation of Significant Differences (ESD) (EPA 2000b).

### 1.2.3 Dredging of Sediments for Disposal in the Slip 1 CDF in Segments 3 and 4

Three different portions of subtidal bottom sediments encompassing the navigation channel, slopes, and embankments are slated for dredging and disposal within the Slip 1 CDF in 2004/5 (Figure 3). Between 159,000 to 186,000 cubic yards of contaminated sediments, consist of fine-grained materials (silts, clays, and fine sands), will be dredged from Segments 3 and 4.

The Port and OCC will dredge approximately 1.63 acres of subtidal channel habitat in SMA 421A (Taylor Way Channel) in Segment 4, down to native (clean) sediment surfaces. The 48,500 cubic yards (including up to 1 foot of overdredge) of PCBs-, metals-, and hydrocarbon-impacted material will be loaded onto flat deck barges for transport to the Slip 1 CDF where it will be placed in the CDF using over-the-berm rehandling methods.

Approximately 0.44 acres of littoral and 1.19 acres of subtidal channel and slope habitat will be dredged in SMA S44 (Sound Refining Shoaling Area) in Segment 4 down to minus 34 to minus

36 feet MLLW. The 14,400 cubic yards (including up to 1-foot of overdredge) of sediment containing hydrocarbons and other contaminants will be transported on flat deck barges to the Slip 1 CDF, where it will be placed using over-the-berm rehandling methods.

In SMAs 301, 321, and 322 (Buffelin/Murray Pacific Channel Area) in Segment 3, the Port and OCC will dredge approximately 2.00 acres of littoral and 7.79 acres of subtidal channel and slope habitat down to one foot below the deepest SQO exceedance, or the deepest historical dredging depth, whichever is deeper. Up to 95,600 cubic yards (including up to 1 foot of overdredge) of tributyl tin (TBT)-impacted material will be transported on flat deck barges to the Slip 1 CDF where it will be placed using over-the-berm rehandling methods. The upper four feet of SMA 342 (Murray-Pacific Embankment Area; about 0.21 littoral habitat acres) will also be excavated or dredged, simultaneously with the adjacent SMA 322 channel area.

This element also includes excavating approximately 1,300 cubic yards of impacted material from the Buffelen Embankment (SMA 341), and potentially backfilling to roughly match existing grade. The Contractor will likely excavate using land-based equipment, working during low tides in order to provide upland access to the exposed intertidal sediments. Activities along this stretch of the shoreline will remediate approximately 0.06 acres of littoral habitat.

In SMA 123 (Puyallup Tribal Area) contaminated slope surface sediments will be dredged to a depth of 3 feet the head of the Waterway (Segment 1) resulting in 2,900 cubic yards over an area of 0.44 acres (made up of 0.18 acres of littoral and 0.26 acres of subtidal habitat).

#### 1.2.4 Capping of Sediments in Segment 4

The highest concentrations of PCBs within SMA 421B are located along the intertidal slope of the Taylor Water Embankment. Dredging the embankment would significantly undercut existing uplands and increase the loss of intertidal habitat, so capping is considered an effective remedial alternative, particularly outside the channel where the property owner could reasonably implement use restrictions. The Port and OCC will cap subtidal portions of SMA 421B three feet of sand; intertidal elevations of the cap will be constructed using a sand base with overlying erosion protection materials, which would concurrently improve habitat functions. They will likely use a barge-mounted conveyor assembly or equivalent methods to place the cap material. Overall, capping within this SMA would remediate approximately 1.81 acres of littoral and 1.43 acres of subtidal habitat.

#### 1.2.5 Capping at Piers 24 and 25 Finger Piers

Pier 24 and 25 Finger Piers extend perpendicular to the shoreline and are located outside of the Hylebos Waterway on the Blair-Hylebos Peninsula (Figure 2). Beneath these structures, bottom sediments are fine-grained materials (silts, clays, and fine sands), all located below elevation

minus 10 feet MLLW. Because dredging beneath these structures is impracticable and damaging or undermining the existing piles is likely, sediment will not be removed from beneath Pier 24 and 25 Finger Piers. However, subtidal sediment surrounding Pier 24 and 25 Finger Piers will be dredged.

The Port and OCC may cap the area below Pier 24 and 25 Finger Piers based on the results of post-construction confirmatory sampling and analysis, to occur following the completion of dredging adjacent to those two piers. Sediment sampling data from beneath Pier 24 and 25 Finger Piers will be compared to the SQO criteria as defined in the CB/NT Record of Decision (ROD) (EPA 1989). Post-construction confirmatory sampling and analysis is described in detail in the Operations, Maintenance, and Monitoring Plan (OMMP) (Hart Crowser and Berger/ABAM 2003b) for the project.

If capping is necessary beneath Pier 24 and 25 Finger Piers, it would be of a 3-foot-thick cap, consisting of 2 feet of sand overlain with 1 foot of gravel. Material for capping will be either clean dredged material determined suitable for beneficial uses or select fill from quarries. Capping would occur over a 2 to 3 week period in 2003/2004, using a hydraulic pump-out system from a dump barge or scow, or by employing a conveyor to transport material under the piers.

Approximately 1.41 acres of subtidal habitat beneath the Pier 24 and 25 Finger Piers are slated for confirmatory sampling. The extent of the area to be capped will be determined based on the results of these sampling efforts. No littoral habitat would be affected as part of this project component.

#### 1.2.6 Pier 25 Embankment

The Pier 25 Embankment is beneath the northernmost portion of Pier 25 along the west side of the Hylebos Waterway. Overall, Pier 25 is approximately 1,260 feet long and 90 feet wide and supported on wooden pilings. Remedial activities along the Pier 25 Embankment will occur over 860 feet of the wharf-covered side slope beneath Pier 25, which includes both littoral and subtidal habitats. The upper portion of the bank slopes steeply (approximately two-to-one) and is riprapped from the top of the bank to approximately elevation zero feet MLLW (Pacific International Engineering 1999a). The riprapped areas contain localized pockets of sandy and gravelly sediment. The bank continues at a two-to-one slope below the riprap to the pierhead line, coincident with the face of the pier. The substrate along the bank below the riprap consists of mixed fines.

The majority of sediment exceeding SQO criteria along the Pier 25 Embankment is located on the side slopes below the riprap (below approximately zero feet MLLW). Material exceeding SQO criteria area is also located in isolated gravelly pockets in the riprap above zero feet

MLLW. In addition, two debris piles consisting primarily of cobbles, brick, and fused pieces of scrap metal are also located beneath Pier 25. The northernmost debris pile measures approximately 90 feet long, by 16 feet wide, by 10 feet high. The southernmost debris pile is located about 200 feet north of the former OCC property boundary (currently Pioneer Americas, Inc.) and measures 100 feet in length, by 18 feet wide, by 5 feet high. These debris piles are estimated to contain approximately 340 cubic yards and 250 cubic yards of material, respectively. The debris piles will be removed using excavating equipment working through the temporary deck openings. As a conservation measure, excavation activities associated with removing the debris pile will be conducted at low tide, whenever possible. The debris will be disposed of off-site at an appropriate upland location.

The Pier 25 Embankment will be capped from an elevation of plus 18 feet MLLW down to the toe of the slope so as to physically and chemically isolate sediment exceeding SQO criteria from benthic organisms, and to prevent resuspension and transport of chemical constituents. Capping along the Pier 25 Embankment would require placing of a total of 13,200 cubic yards of material. This total includes 9,900 cubic yards of gravelly sand and 2,800 cubic yards of crushed rock for use in the lower cap, and 500 cubic yards of gravelly substrate to be placed around and within existing riprap for the upper cap. Capping has been selected as the remedial alternative for the Pier 25 Embankment rather than dredging because dredging under the operational pier along the embankment is impracticable, due to the possibility of damaging or undermining the existing pier and shoreline structures.

Debris removal and capping along the Pier 25 Embankment would take approximately six months. After debris removal and capping, all previously removed pier decking will be replaced. Approximately 0.82 acre of littoral and 0.68 acre of subtidal habitat will be capped as part of this project component. Capping the Pier 25 Embankment will follow dredging within the mouth of the Hylebos Waterway, which means the cap will extend down to the elevations presented on the dredge plan. Substrate characteristics above minus 2 feet MLLW will be modified by the addition of gravelly substrate within the interstices of the riprap, to improve habitat characteristics for salmonids consistent with Performance Criteria A.1.d in the CB/NT ESD, which requires capping material that promotes colonization by aquatic organisms. The substrate below minus 2 feet MLLW, which currently consists of mixed fines, would be capped with gravel-sized crushed rock.

#### 1.2.7 Pioneer/Occidental Embankment

The Pioneer/Occidental Embankment is located immediately south of the Pier 25 Embankment along the west side of the Hylebos Waterway. Sediment along the Pioneer/Occidental Embankment exceeds SQO criteria on the side slopes above zero feet MLLW. Sediment exceeding SQO criteria is also located along the lower subtidal slopes. Similar to the Pier 25 Embankment action summarized above, remedial activities along the Pioneer/Occidental Embankment will occur on pier-covered side slope areas and on open banks, including both

littoral and subtidal areas. As described in the Pre-Remedial Design Evaluation Report (HCC 1999), existing intertidal habitat present in the Pioneer/Occidental Embankment Area is a mixture of relatively steep (typically a ratio of one-foot horizontal to two feet vertical, to two feet horizontal to one-foot vertical) riprap, artificial substrate (fused pieces of scrap metal, concrete), gravel, and mixed fines. The riprapped areas contain localized pockets of sandy and gravelly sediments. The slope continues to the pierhead line. The substrate along the bank below the extent of the riprap consists of mixed fines.

The remedial action within the Pioneer/Occidental Embankment area consists of covering the slope with a sand and gravel cap. Capping along the Pioneer/Occidental Embankment would require the placement of a total of 32,200 cubic yards of material. This total includes 3,300 cubic yards of gravel leveling base material, 13,300 cubic yards sand and gravel, and 6,600 cubic yards of riprap and “habitat substrate” (two and one-half-inch minus angular shoulder ballast). Because of structural constraints (*i.e.*, existing buildings and roads at the Pioneer facility), it is not practicable to remove impacted fill and debris from the Embankment Area.

The preliminary remedial design for Pioneer/Occidental Embankment cap includes placing a gravel leveling layer over the existing riprap, followed by a geotextile to separate the gravel layer from an overlying 2-foot sand cap. In general, the sand cap will extend from plus 18 feet MLLW down the embankment, past the property line, to the base on the slope. Within the intertidal areas of the embankment, the 2-foot sand layer will be overlain by an approximately 1-foot-thick armor section of either gravel, light loose riprap or quarry spalls. This cap section would have a nominal slope of approximately two foot horizontal to one-foot vertical. The cap armor layer will be designed to withstand wake, wave, and propeller wash forces. Voids in the armor layer, as well as the full subtidal surface of the cap, would be covered with “habitat substrate” consisting of two and one-half-inch minus angular shoulder ballast. The cap key will be constructed from riprap at the base of the embankment near the Hylebos Waterway dredge cut, providing support to upslope capping materials.

Construction of the full Pioneer/Occidental Embankment cap would take approximately six months. Approximately 1.91 acres of littoral and 1.51 acres of subtidal habitat will be capped as part of this project component. Capping the embankment will be conducted following dredging of the waterway, which means the cap will extend down to the elevations presented on the dredge plan. Modifications to the littoral habitat along the Pioneer/Occidental Embankment will improve habitat characteristics for salmonids consistent with Performance Criteria A.1.d in the CB/NT ESD, which requires the use of capping material that promotes colonization by aquatic organisms. Further, the cap will be graded to maintain the current slope along the embankment and ensure that there is no net loss of littoral habitat as a result of this project component.

#### 1.2.8 Pioneer/Occidental Embankment Pilot Cap

In August 2003, a pilot cap will be constructed along an approximate 200-foot section of the Pioneer/Occidental Embankment. The cap will be monitored over the following year. The results of the pilot monitoring will be used to verify that the cap successfully achieves sediment isolation and water quality performance standards, or to support redesign of the cap as needed.

#### 1.2.9 U.S. Navy Bank

The U.S. Navy Bank is located on the west side of the Hylebos Waterway and encompasses an area approximately 80 feet wide by 600 feet long. This area is southeast of the Pioneer Americas and OCC properties and northwest of the Port of Tacoma's Parcel 4 Embankment. The U.S. Navy dock is 25 feet wide and parallels an open portion of littoral habitat. The bank slopes at approximately two feet horizontal to one-foot vertical from the top of the bank at elevation of plus 18.2 feet MLLW to minus 30 feet MLLW, coincident with the face of the pier.

Based on the results of the remedial design efforts (Anchor and CRA 2001), approximately two-thirds of the Navy Bank are below SQO chemical or confirmatory biological criteria, and thus do not require remedial action. The remaining one-third of the area, located beneath the existing Navy pier, exceeds SQO criteria for minor biological effects, but does not exceed minimum cleanup level criteria for more than minor effects. Due to the presence of the operational pier along the U.S. Navy Bank, dredging is not a preferred remedial method. Further, natural recovery modeling performed by OCC and the Port (Anchor and CRA 2001) indicates the under pier sediment within the Navy Bank is expected to decline to below SQO criteria within several years of project completion. Thus, U.S. Navy Bank sediments are suitable for natural recovery.

To verify effectiveness of natural recovery in terms of reducing concentrations of constituents of concern, surface sediment in the under pier areas of the U.S. Navy Bank will be monitored in-place during the 10-year natural recovery period (OMMP; Hart Crowser and Berger/ABAM 2003b). The monitoring will include analysis for all chemicals present above SQO criteria during the most recent sampling (HCC 1999 and Anchor and CRA 2001). The area to be monitored is approximately 0.34 acre and include both littoral (0.06 acre) and subtidal (0.28 acre) habitats.

#### 1.2.10 Natural Recovery Areas within Segments 1 and 4

There are three areas within Segments 1 and 4 slated for natural recovery that are included as part of this action (SMAs 103, 401, and 402). In total, approximately 0.38 acres of littoral and 0.25 acres of subtidal habitat will be monitored in place within these three areas during the established 10-year natural recovery period (Figure 3). The primary chemicals of concern within

SMA 401 include bis(2-ethylhexyl)phthalate (Anchor 2001b) and polynuclear aromatic hydrocarbons in 402.

As with monitoring to occur along the U.S. Navy Bank, natural recovery monitoring in these areas will include analysis for all chemicals present above SQO criteria during the most recent sampling. The results of these monitoring activities will be used to verify the effectiveness of natural recovery in terms of reducing concentrations of these constituents of concern.

#### 1.2.11 Parcel 4 Embankment

The Parcel 4 Embankment is a 220-foot bank situated between the U.S. Navy Bank area, and the East Eleventh Street Bridge, along the westerly shoreline of the Hylebos Waterway. Littoral sediment in this area exceed SQO criteria (Hart Crowser 1998). On average, the shoreline in this area is sloped at two feet horizontal to one-foot vertical, with some areas as steep as one-foot horizontal to one-foot vertical and others somewhat more gently sloping at three feet horizontal to one-foot vertical. Surface substrate is variable and consists primarily of riprap and debris above zero feet MLLW. Debris along the upper bank includes concrete blocks, concrete-like material, auto fluff, hoses, wire, wood, and metal. Below the extent of the riprap (typically zero feet MLLW) the substrate is predominantly mixed fines and mud.

Remedial activities proposed for Parcel 4 involve excavating approximately 10,000 cubic yards of shoreline fill, debris, and nearshore sediment over approximately 220 lineal feet of the Embankment. After Parcel 4 excavation is completed, it is expected that certain areas may require minor filling to achieve the final design grade. This component of the project is expected to require placement of up to 200 cubic yards of clean select fill.

In addition, four creosote treated pile dolphins at the site will be removed. Each of the four dolphins to be removed are constructed of three creosote-treated timber piles located at approximately elevation zero feet MLLW. To remove the dolphins, the connections between the pilings will be removed, and each of the piling will simply be lifted from the sediment using a derrick attached to the pile by a choker cable. If the piles cannot be removed by pulling, the piles will be broken off below the mudline. Any pile stubs remaining in the sediment would be cut off at least 2 feet below the finished grade.

Shoreline fill, debris, and sediment ranging from minus 10 feet MLLW to approximately 20 feet landward of the top of the bank will be dredged or excavated, and disposed of within the Slip 1 CDF. Parcel 4 materials dredging will take approximately 2 to 3 weeks, conducted concurrently with dredging the offshore sediments slated for disposal in Slip 1. Most dredging along the

Parcel 4 Embankment will be accomplished using a barge-mounted dredge with a clamshell bucket. A portion of the upper bank material may be excavated using backhoes or other land-based equipment located on the adjacent uplands. Material dredged and/or excavated from the Parcel 4 Embankment will be loaded onto a barge and transported to the Slip 1 CDF for disposal.

Sediments along the Parcel 4 Embankment will be dredged to a depth adequate to expose subsurface sediments that meet the SQO criteria. After dredging it is expected that certain areas may require minor cutting and filling to achieve the final design slope (two feet horizontal to one-foot vertical). Clean select fill material will be used as needed to bring these areas to grade. Shoreline protection materials, consisting of a one-foot filter blanket (two and one-half-inch shoulder ballast) and a 2 foot thick layer of riprap (12- to 15-inch rock) will then be placed on the face of the slope down to an elevation of zero feet MLLW. Habitat substrate will be placed within the interstices of the riprap over the finished slope. The habitat substrate is being provided as a conservation measure and will promote retention of fines and organic material on the slope and colonization by aquatic organisms.

Construction activities in the Parcel 4 Embankment occur exclusively within littoral (above minus 10 feet MLLW) and adjacent upland areas. No subtidal habitat would be disturbed in this project component, however, the subtidal habitat adjacent to and below the Parcel 4 Embankment is slated for dredging. Approximately 0.46 acres of existing littoral habitat would be excavated at the Parcel 4 Embankment. The new slope above zero feet MLLW will be armored with riprap and covered with habitat substrate. Although some areas of the embankment may be steepened slightly, others may become more gently sloping with this project component; the average slope of the Parcel 4 Embankment will be maintained (two feet horizontal to one-foot vertical). Overall, this project component will lead to no net loss of littoral habitat.

#### 1.2.12 Chinook Marina

The Chinook Marina is on the northeastern side of the mouth of the Hylebos Waterway. The marina covers approximately 8.7 acres, including 1.26 acres of littoral and 7.44 acres of subtidal habitat. Sediments throughout the Chinook Marina are suitable for natural recovery. Surface sediments within this area are expected to decline to below SQO criteria within several years following completion of the project. The landowner (Puyallup Tribe of Indians) has indicated that this remedy is acceptable, provided that sediment from three localized areas within the marina are dredged and disposed of at the Slip 1 CDF.

Dredging in these areas will be performed to elevation minus 6 feet MLLW and will involve the removal of approximately 1,144 cubic yards of material. A barge-mounted dredge with a clamshell bucket will be used for dredging. The Port and OCC will load dredged material onto a split-hull or flat deck barge for transport to the Slip 1 CDF, and place the material in Slip 1 either by barge dump; or once the berm crest has been constructed to an elevation that prohibits

entrance of scows, sediment will be placed in the CDF using rehandling methods. The Chinook Marina dredging is expected to take approximately one to two weeks to complete.

The remaining portions of the Chinook Marina (approximately 8.4 acres) would undergo natural recovery and be monitored in-place as part of the established 10-year natural recovery period. Dredging within the Chinook Marina would occur exclusively within the littoral zone and would effect 0.3 acre. The three areas to be dredged would be deepened to minus 6 feet MLLW and no littoral habitat would be converted to subtidal habitat in this project component.

#### 1.2.13 Slip 1 Confined Disposal Site

Slip 1 is a parallelogram-shaped waterway on the westerly side of Blair Waterway, near its mouth (Figure 4). The slip is bounded on the westerly and southerly sides by components of a high intensity marine container terminal facility (Terminal 3/4) and the North Intermodal Yard, and on the easterly side by Blair Waterway. The adjacent uplands are covered by asphalt and concrete. Upland vegetation is absent from Slip 1. Slip 1 is characterized by steep side slopes which are typically a ratio of two feet horizontal to two and one-half feet vertical to one-foot vertical, with the exception of the existing mitigation beach which slopes at approximately three feet horizontal to one-foot vertical. The substrate is typically riprap, rubble, gravel and/or mixed fines. The subtidal habitat in Slip 1 is typical of constructed subtidal habitat throughout Commencement Bay, in that the bottom is flat and dominated by fine substrate. The water column habitat in Slip 1 is also typical of habitat in the more protected portions of the waterways.

Overall, the littoral habitats within Slip 1 are of low quality for the functions analyzed due to steep slopes, riprap substrate, and coverage by piers. The exception to this conclusion is the existing 0.29-acre mitigation beach, which is more gently sloped and has smaller substrate. A COE permit (95-2-00418) has been issued that allows relocation of this mitigation action to Slip 5. The mitigation for that action and potential construction related impacts are described in the forthcoming Terminal 3/4 Northern Expansion Project Biological Assessment (Grette Associates, 2003).

Further, the EPA has already approved certain elements associated with the use of Slip 1 as a CDF that will be completed during the 2002/2003 in-water construction season. These items include demolition of Piers 1 and 2 within Slip 1, dredging of the Slip 1 berm stabilization key trench, and construction of the Slip 1 containment berm, including filling the berm stabilization key, placement of temporary buttress fill at the base of the berm, and completing the containment berm to an elevation of plus 16 feet MLLW. ESA consultation on these items has already been completed and so will not be addressed here (Table 1).

Completing the Slip 1 CDF involves disposing of dredged sediments within the Slip 1 CDF, and placing the primary and final caps over the CDF. Disposal of dredged sediments within Slip 1 will occur after the berm has been completed to an elevation of minus 5 feet MLLW. This first stage (Stage I) of berm construction was completed by mid-January, 2003. While the berm is at an elevation of minus 5 feet MLLW, material would be placed with bottom dump barges and/or flat decked scows. To keep an area available for disposal via bottom dump barge, some material may be mechanically rehandled within Slip 1 creating a gentle incline towards the head of the Slip. Material from flat decked scows would be unloaded into the facility with a front-end loader.

When the fill area reaches approximately minus 10 feet MLLW, Phase II berm construction will raise the berm to an elevation of plus 16 feet MLLW. Once Phase II berm construction is completed, the remaining sediment will be rehandled over the top of the finished berm. At this point in the project, the disposal site will be physically isolated from the Blair Waterway and the remainder of Commencement Bay by the completed berm.

Use of Slip 1 as a CDF will allow the placement of dredged sediment within the Slip 1 CDF up to a design elevation of plus 9 feet MLLW. Overall, approximately 488,700 cubic yards of dredged sediment (in situ basis; including 10 percent contingency) dredged as part of this action from Hylebos Segments 1, 3, 4, and 5 are slated for disposal in Slip 1 (Hart Crowser and Berger/ABAM 2003a).

As the Slip 1 CDF has an estimated disposal capacity of between 624,500 to 648,500 cubic yards, there may be up to 124,800 cubic yards of additional “excess capacity” within Slip 1 that can be used for the disposal of other sediment, since approximately 36,000 cubic yards of treated Area 5106 sediments have already been disposed in Slip 1. Depending on scheduling, technical suitability, applicable regulatory approvals and other constraints, these excess capacity sediments may come from other CB/NT locations, including the Middle Waterway and potentially also from other sites in Puget Sound characterized under similar CERCLA or Model Toxics Control Act programs (*i.e.*, King County material from the Duwamish Waterway, Seattle, WA). Consistent with the requirements of Exhibit D of the Slip 1 Disposal Site Agreement (Port and OCC 1999) all excess capacity sediments will undergo testing to ensure that Marine Water Quality Criteria will be met at the compliance boundary during disposal and that no short-term impacts to water quality will occur at the Slip 1 disposal site. As with the disposal of dredged material from Segments 3, 4 and 5, water quality impacts as a result of excess capacity sediment disposal in Slip 1 will only be a concern while the berm is open.

After filling Slip 1, dredged sediments will be confined and isolated from the environment by a fill cap. The cap will extend from elevation of plus 9 feet MLLW (the maximum height which dredged sediments can be filled to), to roughly plus 18 feet MLLW. The Slip 1 cap will consist of two sections: the primary cap and the final cap. The primary cap will be approximately 7 feet of clean sandy material obtained from either an upland source, or possibly dredged material from

elsewhere in Commencement Bay. Approximately 148,000 cubic yards of material is required to construct the primary cap. The temporary buttress, which was constructed at the base of the containment berm as part of Phase I berm construction (approximately 24,000 cubic yards), would be rehandled over the top of the berm with a clamshell bucket for use as part of the primary cap. The Port and OCC will place the primary capping material via the adjacent uplands with construction equipment selected by the Contractor (backhoe, cat, front-end loader) and/or by rehandling dredged material suitable for beneficial reuse over the top of the containment berm. The final cap will consist of 2 to 2.5 feet of ballast, asphalt paving and drainage. Depending on the thickness of the paving section, approximately 23,000 cubic yards of select fill will be required.

The Slip 1 portion of the project area includes approximately 14.22 acres of aquatic habitat (below plus 11.8 feet MLLW). Filling Slip 1 (including a portion of the footprint of the berm) would convert approximately 13.12 acres of aquatic habitat to upland (habitat located behind the top of the face of the Slip 1 containment berm) affecting 3.12 acres of littoral habitat and 10 acres of subtidal habitat. An additional 1.10 acres of subtidal habitat located within what will become the bayward face of the Slip 1 containment berm would be altered but would remain aquatic habitat.

Overall, use of Slip 1 as a CDF will convert 2.62 acres of littoral habitat to upland. This unavoidable loss of littoral habitat to occur within Slip 1 would be offset by the Slip 5 Mitigation Project and the Phase II of the Clear Creek Habitat Improvement Project.

#### 1.2.14 Slip 5 Habitat Construction - Phase II

The Slip 5 mitigation site is at the end of the peninsula that lies between the Sitcum and Blair waterways, north of Slip 1. In late 1987 and early 1988, the slip was partially developed as a mitigation site to offset the impacts of filling Slip 2 (previously located adjacent to and south of Slip 1) (COE permit OYB-2-011298). Slip 5 was designed as an expandable mitigation site and was used to provide mitigation for the impacts of the expansion of Pier 7D in Sitcum Waterway (COE permit OYB-2-014336) in 1991.

The initial mitigation action at Slip 5 (COE permit OYB-2-011298) involved placing a buttress fill of coarse fill material and dredged material to build beaches with side slopes of a ratio of approximately five feet horizontal to one foot vertical. The dredged material was covered with a layer of select gravel to provide high quality substrate for producing prey organisms for juvenile salmonids. Additional mitigation was built in the slip pursuant to the subsequent permit action (OYB-2-014336) by extending the beach adjacent to Pier 1D. The COE has determined those mitigation actions to be successful in replacing habitat for juvenile salmonids.

The Slip 5 Habitat Construction - Phase I Project constructed in the 2002/2003 in-water construction period the base upon which the rest of the habitat action will be built. The majority of the habitat fill placed during the Phase I action was to elevation minus 10 feet MLLW; however, Phase I construction also involved constructing a “flat” or bench bayward of the “reef” to an elevation of minus 9 feet MLLW. The Slip 5 Habitat Construction – Phase II, which is addressed in this Opinion, will be completed in the 2003/2004 in-water construction period.

The COE has issued a permit (95-2-00418) to construct 0.29 acre of habitat within the apex of the triangle formed by the piers under previous activities pre-dating ESA implementation. That permit authorized the relocation of the existing 0.29-acre mitigation beach from Slip 1 to Slip 5. This construction would be concurrent with Slip 5 Habitat Construction - Phase II but will be addressed in the forthcoming Terminal 3/4 Northern Expansion Project BA (Grette Associates, 2003).

#### *1.2.14.1 Reef and Fill*

Littoral habitat in Slip 5 would be expanded by placement of select material and clean sandy dredged material to create an embayment, which is protected by a rocky reef on the outer edge. The total volume of material to be placed for Phase II construction is approximately 150,000 cubic yards, including approximately 5,000 cubic yards of riprap and 26,000 cubic yards of select fill to construct the rocky reef and 119,000 cubic yards of habitat fill. The reef would provide wave protection for most of the new habitat and increase the level of protection to the existing mitigation beaches. Material dredged from the head of the Blair Waterway (Pierce County Terminal Expansion Project: COE permit 2000-2-00765 and NOAA Fisheries WSB-01-345) and/or upland fill would be used to build the site, although rock would be needed for construction of the bayward face of the slope and the top of the reef.

Phase II of Slip 5 Habitat Construction will sit upon the base constructed during Slip 5 Habitat Construction - Phase I. The reef would extend from elevation of plus 6 feet to zero feet at a slope of approximately three feet horizontal to one-foot vertical on the bayward face. Below zero feet on the bayward face, the feature would slope at two feet horizontal to one-foot vertical to an elevation of minus 9 feet. At elevation minus 9 feet, there will be a 50-foot wide flat, which was completed as part of Phase I of Slip 5 Habitat Construction during the 2002/2003 in-water construction season.

Inside the reef, the constructed slope would vary from approximately five-feet horizontal to one-foot vertical, to twenty-five feet horizontal to one-foot vertical. Because this portion of the site would consist of dredged sands and subsequently deposited fines, it would be reshaped and reworked by wave action. However, this material is not expected to be transported off the site (Pacific International Engineering 1998a).

In total, this action (including the bayward bench) would convert approximately 5.65 acres of subtidal habitat to littoral habitat. This total does not include the acreage of the existing mitigation beaches (approximately 2.8 acres), or the approved 0.29-acre Slip 1 relocation beach.

#### *1.2.14.2 Extension of the Pier 1D Beach*

As part of the previously mentioned permits to construct the existing mitigation beaches, the 600-foot beach on the Pier 1 D side was built. An additional 450 feet of beach is proposed to extend the beach toward Blair Waterway. The proposed beach would be built at similar grade as the existing beach with the intended modifications discussed above (approximately seven feet horizontal to one-foot vertical) and would be dressed with either ballast (angular gravel) or rounded pit-run substrates depending on location.

This beach would extend from plus 8 feet to minus 6 feet MLLW and have a consistent slope. The existing habitat at this site is steeply sloped (two feet horizontal to one-foot vertical) riprap and smaller rock. The existing habitat consists of 0.55 acre of littoral habitat and 0.47 acre of subtidal habitat. After construction, this area would be approximately 1.02 acres of littoral habitat.

#### *1.2.14.3 Upper Slope Substrate Modification*

The existing mitigation beaches adjacent to Pier 1D and Pier 5 were built up to an elevation of plus 8 feet MLLW. Above this elevation, no mitigation actions were conducted, and no mitigation credit was assigned for previous COE permits. The substrate ranges from riprap (Pier 1D side) to concrete rubble (Pier 5 side). The slopes range from two feet horizontal to one-foot vertical to one and one-half horizontal to one-foot vertical. Overall, the habitat in this portion of Slip 5 is of very low quality due to the substrate and slope. The proposed mitigation action is to place select substrate and LWD along both shorelines. In total, this project would improve approximately 0.42 acre of littoral habitat (plus 11.8 to plus 8 feet MLLW).

A total of 10 pairs of LWD cover structures will be installed along the shorelines of the Slip 5 Mitigation Site, generally along the apex of the Slip 5 site and along the southeastern shoreline. Each of the 10 structures will consist of two trees, including root wad and branches. The tips of the trees will be connected together with cable. All LWD pairs will be placed between plus 13 feet and plus 10 feet MLLW and anchored with three buried ecology blocks; one near each of the root wads and a common anchor where the two trees are fastened together. Cables connecting the ecology blocks to the LWD pairs will be tight enough to keep the structure from floating or rolling during extreme high tides. Trees will be either Douglas fir or red cedar and a minimum of 18 inches at the butt and between 30 and 40 feet long.

The reef and fill (4.90 acres) and bayward bench (0.75 acre) actions will convert 5.65 acres of subtidal habitat to littoral habitat. Additionally, the proposed site of the extension of the Pier 1D beach currently consists of steeply sloped littoral (0.55 acre) and subtidal (0.47 acre) habitat. This entire area (1.02 acres) would be converted to gently sloping littoral habitat by placement of dredge material and select fill as part of the extension of the Pier 1D beach action. This action would yield a net conversion of 0.47 acre of subtidal habitat to intertidal and shallow subtidal habitat. The area to be modified as part of the upper substrate modification action will remain littoral habitat.

After construction, the mitigation acreage will consist entirely of littoral habitat. In total, the mitigation action in Slip 5 would provide 7.09 acres of littoral habitat. This represents a net conversion of 6.12 acres of subtidal habitat to littoral habitat. Overall, 0.97 acres of existing littoral habitat is improved through changes in slope and substrate.

In order to evaluate the success of the Slip 5 mitigation element, the Port and OCC will implement a long-term monitoring program. They will measure structural integrity, such as acreage constructed, elevation changes, and substrate distributions. Habitat function will be quantified using surveys of benthic production, fish catch and behavior, and bird use observations. Sampling for juvenile salmonids will be conducted during late April, mid-May, and early June using a floating beach seine. Two habitats, sandflat/mudflat and gravel/cobble, will be monitored at a minimum of three locations along the inside of the reef during the years 1, 3, and 6 (BA Addendum, Attachment F, Exhibit B).

#### 1.2.15 Duration and Timing of Construction Activities

Project construction is not expected to adversely affect juvenile salmonids, as in-water construction activities would occur during a time when few juvenile salmonids are present (Table 2). The construction schedule presented below allows the least intrusive activities, which would have a negligible effect on listed species, to be completed during a broader timeframe (July 16 through February 29), while limiting activities with a higher risk of impact to a narrower in-water work period (August 16 through February 14). Should unforeseen circumstances require, any of the project elements, except for the Slip 5 Habitat Construction - Phase II, could be delayed for one year under this Opinion.

**Table 2: Construction Schedule**

<b>Proposed Action</b>	<b>Duration</b>	<b>In-Water Work Period</b>
PSDDA Channel Dredging	7½ months	7/16/2003 through 2/29/2004
Dredging of Select SMAs Slated for Slip 1 Disposal	4 weeks	7/16/2003 through 2/14/2004

Channel Dredging (Seg. 5) Slated for Slip 1	6 months	8/16/2003 though 2/14/2004
Channel Dredging (Seg. 1,3,4) Slated for Slip 1		8/16/2004 through 2/14/2005
Pier 24 and 25 Finger Pier Capping Segment 4 Capping	2 to 3 weeks	8/16/2003 though 2/14/2004 8/16/2004 through 2/14/2005
Pier 25 Embankment	6 months	8/16/2003 though 2/14/2004
Pioneer/Occidental Embankment Pilot Cap	6 months	16/2003 though 2/14/2004
Pioneer/Occidental Embankment	6 months	16/2004 though 2/14/2005
Parcel 4 Embankment	2 to 3 weeks	8/16/2003 though 2/14/2004
Chinook Marina Dredging	1 to 2 weeks	8/16/2003 though 2/14/2004
Slip 1 CDF Fill Placement	13 months	7/16/2003 through 2/14/2004 and 8/16/2004 through 2/14/2005
Slip 5 Habitat Construction – Phase II <sup>1</sup>	7 months	7/16/2003 through 2/14/2004

<sup>1</sup> For the protection of migrating juvenile salmonids, the Port has agreed to an in-water work period of July 16 through February 28 (29 on leap years) for the Pierce County Terminal Expansion Project. Because the Slip 5 Mitigation Site will be constructed of clean material dredged from Pierce County Terminal, it is appropriate to allow parallel construction seasons for these two Projects.

### 1.3 Description of the Action Area

The action area for the proposed project is all portions of the Commencement Bay shoreline from midway between Brown's Point and Hylebos Waterway to the southern boundary of the ASARCO site at depths shallower than minus 60 feet MLLW and the Puyallup River downstream from the I-5 bridge (Figure 1). The action area corresponds to that in the BA prepared for remediation of the entire CB/NT CERCLA Site (EPA 2000a). Section 4 of the CB/NT BA includes a detailed description of the historic and current conditions in the action area and should be referenced for this information.

## 2.0 ENDANGERED SPECIES ACT BIOLOGICAL OPINION

### 2.1 Evaluating Proposed Actions

NOAA Fisheries must determine whether the proposed Federal action is likely to jeopardize the listed species and/or whether the action is likely to destroy or adversely modify habitat. Critical habitat is not currently designated for Puget Sound chinook, so the adverse modification analysis will not occur in this document. The standards for determining jeopardy as set forth in section 7(a)(2) of the ESA are defined by 50 CFR Part 402 (the consultation regulations). The jeopardy

analysis involves the initial steps of: (1) defining the biological requirements of the listed species; and (2) evaluating the relevance of the environmental baseline to the species' current status.

From that, NOAA Fisheries evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NOAA Fisheries must consider the estimated level of injury and mortality attributable to: (1) collective effects of the proposed or continuing action, (2) the environmental baseline, and (3) any cumulative effects. This evaluation must take into account measures for survival and recovery specific to the listed species' life stages that occur beyond the action area. A finding of jeopardy is appropriate if the action, together with the baseline conditions and cumulative effects appreciable reduces the species' likelihood of survival or recovery by reducing the numbers, distribution, or reproduction of the species. If NOAA Fisheries finds that the action is likely to jeopardize, NOAA Fisheries must identify reasonable and prudent alternatives for the action.

For this specific action, NOAA Fisheries' analysis considers the extent to which the proposed action impairs the function of habitat elements necessary for rearing, refugia, and migration of Puget Sound chinook salmon in view of the fact that the proposed action occurs within the Puget Sound chinook ESU. An ESU is a distinct population segment within a species, the preservation of which is important to maintain genetic diversity of that species, and therefore available for protection under the ESA (16 U.S.C. 1532(16)).

#### 2.1.1 Biological Requirements

The first step NOAA Fisheries uses when conducting the ESA section 7(a)(2) analysis is to define the species' biological requirements. Biological requirements are those conditions necessary for the listed ESU's to survive and recover to naturally reproducing population sizes, at which protection under the ESA would become unnecessary. This will occur when populations are large enough to safeguard the genetic diversity of the listed ESUs, enhance their capacity to adapt to various environmental conditions, and allow them to become self-sustaining in the natural environment. The biological requirements for Puget Sound chinook include adequate food (energy) source, flow regime, water quality, habitat structure, passage conditions (migratory access to and from potential spawning and rearing areas), and biotic interactions (Spence *et al.* 1996). The specific biological requirements for Puget Sound chinook that are influenced by the action considered in this Opinion include food, water quality, habitat structure, and biotic interactions.

#### 2.1.2 Environmental Baseline

The environmental baseline represents the current set conditions to which the effects of the proposed action would be added. The term “environmental baseline” means “the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process” (50 CFR 402.02).

Numerous activities affect the present environmental baseline conditions in the action area including expanding urban development, railroads, shipping, logging, agriculture, and other industries. The present port area of Tacoma was created during the late 1800s and early part of the 1900s by filling the tidal marsh that had developed on the shelf of the Puyallup River delta. Continuing habitat alterations such as dredging, relocation and diking of the Puyallup River, dredging/construction of the waterways for purposes of navigation and commerce, steepening and hardening formerly sloping and/or soft shorelines with a variety of materials, and the ongoing development of the Port of Tacoma and other entities has resulted in substantial habitat loss (Sherwood *et al.* 1990, Simenstad *et al.* 1993).

Historically, this area comprised the estuarine delta of the Puyallup River. With the growth and development of Tacoma, its port, and the surrounding region, the delta has been subjected to dramatic environmental changes, primarily from dredging and filling to create the waterways. Past development activities along the shorelines of Commencement Bay have affected, and future activities may affect, the habitat and the fish that use it (Duker *et al.* 1989). It has been estimated that of the original 2,100 acres of historical intertidal mudflat, approximately 180 acres remain today (COE *et al.* 1993). Fifty-five acres of the 180 acres of low gradient habitat are located near the mouth of the Puyallup River, twenty acres are the Milwaukee habitat area, 18 acres are located bayward of the East Eleventh Street Bridge in the Hylebos Waterway, 54 acres are located in the rest of the Hylebos Waterway, 46 acres are present along the shoreline from the mouth of the Hylebos to Browns Point, and eight acres are located in the Blair Waterway (Pacific International Engineering 2001b). Graeber (1999) states that 70% of Commencement Bay estuarine wetlands and over 98% of the historic Puyallup River estuary wetlands have been lost over the past 125 years.

The historical migration routes of anadromous salmonids into off-channel distributary channels and sloughs have largely been eliminated and historical saltwater transition zones are lacking (Kerwin 1999). Additionally, the chemical contamination of sediments, in certain areas of the Bay, has compromised the effectiveness of the remaining habitat (COE *et al.* 1993, USFWS and NOAA 1997).

In 1981, the EPA listed Commencement Bay as a Federal CERCLA site. As a result, the clean up of contaminants has been a high priority and has resulted in 63 of 70 sites being remediated (Kerwin 1999). In 1993-1995, the entire Blair Waterway navigation channel was dredged as part of the Sitcum Waterway Remediation Project. Contaminated sediments were removed and

capped in the Milwaukee Waterway nearshore confined disposal site. After the completion of the dredging, the EPA deleted the Blair Waterway and all lands that drain to the Blair Waterway from the National Priorities List (Pacific International Engineering 2001a).

The shorelines of Commencement Bay have been highly altered by the use of riprap and other materials to provide bank protection. Bulkheads cover 71% of the length of the Commencement Bay shoreline. Based on shoreline surveys and aerial photo interpretation of the area, approximately 5 miles, or 20% of the Commencement Bay shoreline, is covered by wide over-water structures (Kerwin 1999). These highly modified habitats generally provide poor habitat for juvenile salmon (Spence *et al.* 1996).

From 1917 to 1927, most of the habitat alteration (162 acres of mudflat, 72 acres of marsh) resulted from dredging the various waterways and from filling to build uplands for piers, wharves, and warehouses (USFWS and NOAA 1996). Currently, natural aquatic habitats are highly fragmented and dispersed across the delta and Bay with few natural corridors linking them. Fish preferentially occupy shallow water areas, and have been documented in mitigation and restoration sites (Miyamoto *et al.* 1980, Dukar *et al.* 1989, Pacific International Engineering 1999b) both north and south of the river mouth, although perhaps tending more to the north (Simenstad 2000). Commencement Bay is a documented rearing and migration corridor for chinook salmon (Simenstad *et al.* 1982, Duker *et al.* 1989, Wash. SASSI 1992, Pacific International Engineering 1999b, Simenstad 2000). Some modified and relic habitats and most mitigation habitats along the delta front and in the waterways still support juvenile salmon by providing attributes such as food and refuge. However, negative impacts to salmon from their migration through and residence in the delta-bay system has not been quantified (Simenstad 2000).

The Port currently comprises 2,400 acres of upland that support numerous commercial or industrial activities located on or adjacent to each of the waterways (Blair, Hylebos, and Sitcum). Baywide, these industries include pulp and lumber mills, shipbuilding and ship repair facilities, shipping docks, marinas, chlorine and chemical production, concrete production, aluminum smelting, oil refining and food processing plants, automotive repair shops, railroad operations, and numerous other storage, transportation, and chemical manufacturing plants.

The environmental baseline is significantly degraded. Ninety-eight percent of historically available intertidal marsh and mudflat habitat, necessary for estuarine lifestage (smoltification) of juvenile salmonids, has been lost due to the above described human activities. The remaining two% of estuarine habitat is seriously degraded by the presence of toxic and hazardous contaminants in the sediments, which is the habitat for the prey organisms of juvenile salmonids. The baseline conditions of the action area are a significant factor in the current depressed status of Puget Sound chinook.

At present, salmonid habitat within Commencement Bay shorelines is gradually increasing in acreage because of habitat restoration projects and natural processes. Approximately 50 acres of intertidal and shallow subtidal habitat have been created through previous restoration actions.

### 2.1.3 Status of the Species

When NOAA Fisheries considers the current status of the listed species it takes into account species information, *e.g.*, population size, trends, distribution, and genetic diversity. To assess the current status of the listed species, NOAA Fisheries starts with the determinations made in its decision to list for ESA protection the ESUs considered in this Opinion and also considers any new data that are relevant to the determination.

Puget Sound chinook salmon were listed on March 24, 1999 (64 FR 14308). The species status review identified the high level of hatchery production, which masks severe population depression in the ESU, as well as severe degradation of spawning and rearing habitats, and restriction or elimination of migratory access as causes for the range-wide decline in Puget Sound chinook salmon stocks (NOAA Fisheries 1998a, and 1998b). Within the Puyallup basin, virtually all salmon spawn in the Puyallup River, upstream of Commencement Bay. The naturally spawning chinook population in the Puyallup River is comprised of an unknown mixture of natural and hatchery origin fish.

Juvenile chinook migrating through the Puyallup River delta and Commencement Bay originate from three basic stocks (Wash. SASSI, 1992): White (Puyallup) River spring; White River summer/fall; and Puyallup River fall. Juvenile salmon use estuaries for physiological adaption, foraging, and refuge. As described by Simenstad (2000), some aspects of the early life history of juveniles in estuaries are obligatory, such as the physiological requirement to adapt from freshwater to saltwater. Generalized habitat requirements of juvenile chinook in estuaries include shallow water, typically low gradient habitats with fine unconsolidated substrates and aquatic, emergent vegetation; areas of low current and wave energy; and concentrations of small epibenthic invertebrates (Simenstad *et al.* 1985).

Artificial propagation programs likely provide most of the numbers of chinook in the Puyallup River. The White River spring chinook population which is considered critical by state and tribal fisheries managers depends largely on artificial production (Wash. SASSI 1992). The White River spring chinook have lately experienced a tenuous rebound as escapement gradually has increased from the historic lows of the 1980s. In 2000, non-tagged returns of adults was 1,732 individuals, the largest return in 30 years. This increase is consistent with larger numbers of chinook in the Columbia River during 2000, indicating good ocean survival (NOAA Fisheries 2001).

The White River summer/fall chinook stock is considered wild and classified by the co-managers as distinct based on geographic distribution. The glacial melt waters, typical of the Puyallup River, cause poor visibility during spawning season. Due to this, the stock status is unknown (Wash. SASSI 1992).

Numbers of Puyallup fall chinook have recently been compiled by the Puyallup Tribe of Indians for the Washington State Shared Strategy indicating the current number of spawners at 2,400. The Washington Shared Strategy is a voluntary and collaborative effort that is developing goals for recovery planning ranges and targets building on existing efforts of local governments, watershed groups, and various state, Federal, and tribal entities to produce a viable recovery plan. Targets relating the quality and capacity of chinook habitat to population response associated with recovered habitat indicated a range of 5,300 to 18,000 spawners necessary for a recovered system (Puyallup Tribe 2002).

Field observations of Puget Sound chinook in the action area revealed that habitat use differed between the mouth and the head of waterways and also between the locations of the waterways in relation to the Puyallup River. The Puyallup Tribe of Indians conducted beach seine sampling between the years 1980 -1995 (however, no data was available in 1988, 1989, and 1990). Dukar *et al.* (1989) conducted an extensive beach seine juvenile sampling effort in 1983 at many of the same beach seine sampling locations as the tribe's efforts plus tow net sampling to investigate distribution in the open water habitats of Commencement Bay. In addition, sampling of salmonid distribution has been conducted at a number of sites during the course of impact assessment and/or mitigation site planning. Some general conclusions from these studies indicated that: juvenile chinook are present in low numbers in March, peak in late May or early June and drop to low numbers again by July 1; the progeny of naturally spawned chinook arrive in the estuary throughout this period at a variety of lengths; offshore catches of chinook peak about 2 weeks later than shoreline catches; and all shorelines are used but catches are typically higher near the mouths of the waterways than near the heads (Kerwin 1999). Hooper (in USFWS 2001) compiled catch per unit effort of chinook salmon at sites close to and further away from the Puyallup River. This data found that the catch per unit effort averaged 20.4 in the Milwaukee Waterway, 2.93 in the Blair Waterway and 1.99 in the Hylebos Waterway. The catch per unit was higher in the waterways closest to the river (USFWS 2001).

## **2.2 Effects of the Proposed Action**

NOAA Fisheries must consider the estimated level of injury and mortality from the effects of the proposed action. ESA implementing regulations define "effects of the action" as "the direct and indirect effects of an action on the species or habitat together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline" (50 CFR 402.02).

### **2.2.1 Direct Effects**

Direct effects are the immediate effects of the project on the species or its habitat. Direct effects result from the agency action and include the effects of interrelated and interdependent actions. Future federal actions that are not a direct, interdependent, or interrelated, effect of the action under consideration (and not included in the environmental baseline or treated as indirect effects) are not evaluated (50 CFR 402.02).

The direct effects of the project derive from the nature, extent, and duration of the construction activities in the water and whether the fish are migrating and rearing at that time. Direct effects of the project also include immediate habitat modifications resulting from the project. In the proposed project, immediate positive effects include the removal of highly contaminated materials from the intertidal area which juvenile salmonids use. The construction of enhanced intertidal structure in Slip 5 to provide nearshore estuarine habitat and in Clear Creek Phase II to provide offchannel freshwater salmonid rearing habitat will provide direct long-term beneficial effects. Negative effects may occur during various construction activities, including the dredging of highly contaminated sediments, capping, and the disposal of the sediments in Slip 1 CDF. However, these effects are of limited duration.

#### *2.2.1.1 Dredging*

The dredging element area encompasses approximately 53 acres, all of which is subtidal habitat, below minus 10 feet MLLW. Dredging (or excavating from upland) in littoral areas above minus 10 feet MLLW are also planned within discrete portions of Segments 1, 3, and 5, including the Puyallup Tribal area, areas adjacent to the Buffelen and Murray-Pacific properties, the Sound Refining Shoaling areas, the Chinook Marina, and Parcel 4 Embankment (additional 3.65 acres). Dredging will remove sediments exceeding SQO criteria in the Hylebos Waterway, exposing native sediment that were not subject to historical contamination or, at a minimum, cleaning up surface sediments to the point where chemical concentrations do not exceed SQO criteria. This activity, when considered together with subsequent remedial actions to occur subsequently within the project area (*i.e.*, embankment capping activities) does not permanently convert littoral habitat to subtidal. The project includes dredging of approximately 474,000 cubic yards of contaminated sediments and 179,000 cubic yards of PSDDA-disposable sediments.

Sediment plumes are often associated with dredging. Dredging activities disturb and suspend sediment creating turbid conditions, which cause discoloration of the water, reducing light penetration and visibility, and changing the chemical characteristics of the water. The size of the sediment particles and tidal currents are typically correlated with the duration of sediment suspension in the water column. Larger particles, such as sand and gravel, settle rapidly, but silt and very fine sediment may be suspended for several hours. LaSalle (1990) described a downstream plume that extended 900 feet at the surface and 1500 feet at the bottom. LaSalle (1990) also noted an increase in sediment levels upwards of 70% from the effect of the pressure wave created by the dredge bucket as it descended through the water.

The potential mechanisms by which turbidity could affect salmonids include direct mortality, injury by entrainment, sublethal effects (stress, gill damage, and increased susceptibility to disease), and behavioral responses (disruptions to feeding or migration) (Pacific International Engineering 2001c). Long-term ecosystem effects of dredging generally include changes in the volume and area of habitat, periodic changes to primary and secondary production (food web effects), and changes in hydrodynamics and sedimentology (Nightingale and Simenstad 2001).

Biological effects to Puget Sound (PS) chinook salmon may result from: (1) temporary reduction in water quality and increased noise disturbance associated with dredging that potentially could exclude salmonids from their estuarine sediment substrates; (2) seasonal loss of benthic organisms and other prey due to disturbance of the sediment substrates; (3) short-term alteration to nearshore habitats; and (4) potential exposure to contaminated sediments or water.

The impacts on water quality (from suspended sediments and altered chemical composition) from dredging can have detrimental effects on salmonids. Suspended sediments can have an adverse effect on migratory and social behavior as well as foraging opportunities (Bisson and Bilby 1982; Sigler *et al.* 1984; Berg and Northcote 1985). Servizi (1988) observed an increase in sensitive biochemical stress indicators and an increase in gill flaring when salmonids were exposed to high levels of turbidity (gill flaring allows the fish to create sudden changes in buccal cavity pressure, which acts similar to a cough). Chemical composition of the water with suspended sediments is also affected by dredging activities. Estuarine sediments are typically anaerobic (anoxic) and create an oxygen demand when suspended in the water column, and in turn would decrease Dissolved Oxygen (DO) levels (Hicks *et al.* 1991; Morton 1976).

A review of the processes associated with DO reduction (Lunz and LaSalle 1986; Lunz *et al.* 1988) suggested that DO demand of suspended sediment is a function of the amount of material placed into the water, the oxygen demand of the sediment, and the duration of suspension. Dissolved Oxygen reductions appear to be most severe lower in the water column and usually the condition reverses with adequate tidal flushing (LaSalle 1990). Most of the research reported to date indicated that dredging-induced DO reductions are a short-term phenomena and do not cause problems in most estuarine systems (Slotta *et al.* 1974; Smith *et al.* 1976; Markey and Putnam 1976). The level of DO will be monitored during dredging; operational changes will be implemented as necessary to comply with water quality criteria at the mixing zone boundary.

Decreases in DO levels have been shown to affect swimming performance levels in salmonids (Bjornn and Reiser 1991). The decrease of swimming performance due to decreases in DO could directly affect the chinook salmon's ability to escape potential predation or could affect their ability to forage on motile fish. Smith *et al.* (1976) found DO levels up to 2.9 milligrams per liter (mg/l) during dredging activities in Grays Harbor. Hicks (1999) observed salmon avoidance reactions when DO levels dropped below 5.5 mg/l. Dredging fine sediments such as those found in the Hylebos Waterway could create a sediment plume that may not disperse rapidly because of tidal fluctuations, especially during incoming tides. This could create poor

water quality (*i.e.*, decreased DO levels) that might impede chinook salmon from immigrating into the Hylebos Waterway to gain access to foraging, rearing, and/or refugia habitats.

Based on the EPA's (2000a) analysis of the effects of increased suspended sediment concentrations on salmonid species (see section 7.1 of the CB/NT BA) and the results of dredged material modeling in the BA Addendum, the dredging of this project would not produce suspended sediment concentrations dangerous to salmonids. In addition, the Contractor will be responsible for submitting a Construction Control Plan, which will present the system through which the Contractor assures compliance with the project's Water Quality Standards. Further, turbidity will be monitored in the vicinity of dredging operations during and for specific times before and after construction. If Water Quality Criteria are exceeded at the compliance boundary the Contractor will be required to modify the operations. Such modifications may include slowing the dredging rate.

The potential for short-term loss of chemicals to the waters of Commencement Bay during project dredging was analyzed during Round 1 of the Pre-Remedial Design Investigation (Striplin 1998). A Standard Elutriate test (SET) was used to measure the water quality impacts associated with project dredging. Leachate water samples were analyzed for selected metals, semivolatile organics, pesticides, and PCBs. Maximum detected concentrations of these chemicals in the SET were below applicable EPA acute marine water quality criteria. The results of this analysis suggest that dredging would not result in chemical concentrations within the water column that would exceed relevant and appropriate water quality criteria that are protective of aquatic species. Further, water quality impacts associated with dredging are temporary in nature and generally restricted to the point of dredging (Bohlen *et al.* 1979). Overall, dredging of project sediment would not result in short-term water quality impacts attributable to dissolution of chemical from sediment that would adversely affect chinook salmon.

Disruption of the channel bottom and entrainment by dredging has a negative impact on benthic biota and forage fish. Filter feeding benthic organisms can suffer from clogged feeding structures, reduced feeding efficiency, and increased stress levels (Hynes 1970). Dredging may also suppress the ability of some benthic species to colonize in the dredged area, thus creating a loss of benthic diversity and food source for the chinook salmon prey species. Dredging will temporarily eliminate littoral and shallow subtidal habitat for chinook salmon and will likely reduce foraging opportunities, which may cause them to migrate into deeper waters where there is greater vulnerability to predation and less foraging opportunities. Also, due to the level of contamination and the physical quality of the existing substrate, the subtidal benthic community in the project area is already seriously depressed. Therefore, the normal short-term reduction in benthic habitat and prey from this type of dredging will probably not be measurable in the action area.

Hylebos Waterway Project sediments would be dredged using a clamshell bucket. Clamshell dredges have a bucket of hinged steel with a “clamshell” shape that is suspended from a crane. The bucket, with its jaws open, is lowered to the bottom surface. When the force of the bucket weight hits the bottom, the clamp grabs a section of sediments (Nightingale and Simenstad 2001). Because the jaws are open during descent, a clamshell is less likely to entrap or contain fish (Pacific International Engineering 2001b). Dredging with a mechanical clamshell bucket would increase suspended sediment concentrations throughout the entire depth of the water column at the point of dredging. Resuspension of sediment would occur during clamshell impact, closure, withdrawal, and lift to the haul barge. Clamshell dredging causes very limited, short-term and localized turbidity; no long-term impacts should result from this turbidity.

In summary, the EPA will require that Port and OCC will minimize the effects of dredging on listed fish by working under timing restrictions to minimize fish presence. The EPA will also monitor the chemical constituents, turbidity, dissolved oxygen and other in-water parameters, and will modify the dredging practices by conventional means (*e.g.*, rate of dredging, changing bucket type, scheduling on tidal cycles), if any of the parameters exceed Clean Water Act water quality criteria.

#### *2.2.1.2 Capping*

Capping will occur along the Pier 25 Embankment, the Pioneer/Occidental Embankment, the Taylor Way Properties, along submarine utility corridors, and potentially beneath Pier 24 and 25 Finger Piers. Approximately 9.86 acres of aquatic habitat (including the Pier 24 and 25 Finger Piers) with sediment exceeding SQO criteria will be capped in the Hylebos Waterway, including, approximately 5 acres are littoral habitat. Another 1.41 acres of subtidal habitat may be capped beneath Pier 24 and 25 Finger Piers depending on the results of post-construction confirmatory sampling.

All capping to occur above minus 10 feet MLLW will be capped with material either equivalent to or slightly coarser than the existing substrate. These shoreline protection measures have been specifically designed to improve salmonid habitat function, while maintaining the existing level of erosion protection. Capping associated with these project elements will occur during a period of several months over the duration of the project and will result in a temporary and localized increase in suspended sediment concentrations as the clean capping material descends through the water column. There is also the potential that existing surface sediment would be suspended at the point of impact as the cap material comes in contact with the bottom (Pequegnat 1983, Truitt 1986). On the steeper shorelines, the new substrates will typically consist of riprap overlain with gravel and cobble sized particles. Substrate (2 ½-inch minus angular shoulder ballast) will be placed in the interstices of the riprap to enhance the productivity of the habitat. Over time, fine-grained sediment deposition in more quiescent areas of the waterway will partially fill the interstices among the riprap, quarry spalls, and habitat substrate, further

enhancing epibenthic and infaunal productivity. All capped or backfilled slopes will be graded at an equal or lesser slope.

The cap material on the deeper and flatter subtidal areas will consist of an assortment of clean, oxygenated gravelly sand, gravel-sized crushed rock, and sand with low organic content, and thus are not expected to result in a change in sediment oxygen demand (and resulting DO reduction) during transport through the water column. The coarse nature of the cap materials will produce lower turbidity for a shorter period of time in comparison to turbidity caused during dredging operations. Research by MEC Analytical (1997) indicates that fine sand and larger particles sank to the bottom within minutes. In addition, capping will take place in less than 35 feet of water and material will be placed in a controlled manner to minimize the free fall distance. All capping material will settle out quickly, with the majority of the material being contained on the overall cap footprint.

The potential for re-suspension of sediment during cap placement will vary, based on the placement technique. Data collected after the placement of a sand cap over very fine, unconsolidated material at the Bellingham Log Pond restoration site and the Simpson restoration site using a low-energy delivery system showed that little or no sediment was entrained in the clean cap (Parametrix 1989; EPA 2000a; Anchor 2001a). Based on this analysis, the potential for re-suspension of bottom sediment during cap placement should be minimal.

Minimization measures to reduce the concentration of suspended sediment during cap placement will be employed during project construction. These measures include placing capping material at low tides, placing material in a controlled manner and minimizing the free fall distance of the capping materials. Further, due to the construction schedule, project construction will occur when juvenile chinook salmon are not present in appreciable numbers in the action area, and turbidity caused by capping will have little or no adverse impacts to these species. With the control of upland sources of water and sediment chemistry, the EPA (2000a) expects that these sediments would not become re-contaminated after placement or in the foreseeable future.

The subtidal benthic community would experience reduced productivity for periods lasting up to 2 to 3 years following placement of materials (Wilson and Romberg 1996). Capping in littoral areas would smother the existing epibenthic community leading to a short-term change in the epibenthic community. As with littoral areas disturbed by dredging, recolonization by epibenthic organisms is expected to occur rapidly (within months) after placement of materials. Based on the construction schedule (temporary cessation of in-water construction by mid-February of each year) and the expected rapid recolonization by epibenthic prey, littoral habitat would not experience a significant loss of function that would affect juvenile salmonids. However, it is acknowledged that minor temporal lags (months) in recovery of productivity of disturbed littoral habitat could temporarily reduce feeding opportunities for small numbers of early migrating juvenile chinook salmon.

The 2004 capping of this site will occur within an approved work window to minimize fish presence at that time, and will be conducted in-the-dry, where feasible both measures to reduce the likelihood of Puget Sound chinook's exposure to in-water effects. The EPA will also use Best Management Practices (BMPs) to reduce the amount and duration of turbidity and its impacts at that time. Therefore, short-term, negative effects of capping will be minimized, and the long-term effect of the capping will be beneficial.

#### *2.2.1.3 Natural Recovery*

For specific portions of the Hylebos Waterway, the EPA's 1989 Record of Decision (ROD; EPA 1989) and 2000 Explanation of Significant Differences (ESD; EPA 2000b) selected natural recovery as the preferred remedial approach. Natural recovery is applicable to areas where surface sediments are predicted to recover to below SQO criteria within ten years following completion of remedial activities within the waterway. As specified in the ROD, natural recovery is only applicable to marginally impacted sediments - defined by the EPA as those with chemical concentrations less than the second lowest Apparent Effects Threshold value, or those with biological test results that do not exceed the minimum cleanup level values under the Washington State Sediment Management Standards. Where PCBs are present, marginally impacted sediments are those with PCB concentrations between 300 and 450 micrograms per kilogram, as identified in the 1997 (EPA 1997a) and 2000 ESDs (EPA 2000b).

Based on detailed chemical and biological sampling, and modeling of natural recovery processes, the 2000 ESD and the Pre-Remedial Design Evaluation report (HCC 1999) concluded that the following general SMA areas within the Hylebos Segments 3, 4, and 5 were suitable for natural recovery:

- Chinook Marina and adjoining berthing areas in Segment 5;
- Navy Bank berthing and adjoining channel area in Segment 5;
- Tacoma Public Utilities embankment area (SMA 402) in Segment 4;
- Joseph Simons embankment, berthing, and channel areas (SMA 401) in Segment 4;
- Buffelen/Murray-Pacific channel area (SMA301) in Segment 4; plus
- The former Wasser and Winters embankment area (SMA 103) in Segment 1.

The EPA believes that the no-action remedial activity for these SMAs does not constitute an impact on listed species; however, such natural recovery sites will be rigorously monitored as part of the long-term OMMP. Natural recovery monitoring in these areas will include analysis for all chemicals present above SQO criteria during the most recent sampling. The monitoring results will be used to verify the effectiveness of natural recovery in terms of reducing concentrations of these constituents of concern. Should future performance monitoring results confirm the predicted reduction in concentrations of contaminant in the 10-year period, no

further remedial activities are planned. NOAA Fisheries considers the EPA's decision to conduct no remediation on these SMAs to be part of their overall Action under ESA.

#### *2.2.1.4 Disposal of Contaminated Sediments in Slip 1 CDF*

Initially, sediments will be disposed of within Slip 1 by bottom-dump barges until a point is reached when either the fill elevation prevents barge access into the slip or water quality criteria are exceeded at the compliance boundary. At this point the Stage II berm will be constructed, eliminating barge access and the remaining sediments will be rehandled over the top of the finished berm. However, while the berm remains open, the potential exists for suspended sediments generated during disposal to exchange with the Blair Waterway.

Modeling was used to estimate the amount of turbidity generated by dumping the contaminated sediments directly from barges into Slip 1; under all conditions modeled, turbidity concentrations would be below the 10 NTU criteria at the compliance boundary (300 feet) for disposal events further than approximately 400 feet south of the berm. There is potential for water quality exceedance if disposal is closer than approximately 400 feet south of the berm, under the maximum ebb tide. However, because the scenarios modeled included a number of conservative assumptions, the Contractor is expected to be able to modify operations, especially the scheduling of disposal during incoming or slack tides, to decrease the potential for water quality exceedances when disposing of sediments within 400 feet of the berm. For example, when modeling flood tide conditions, disposal could occur within approximately 100 feet or less of the berm centerline without the potential for turbidity criteria exceedances at the mixing zone boundary.

Overall, suspended sediment concentrations are not expected to reach levels dangerous to salmonids and any effects on water quality would be temporary. Turbidity will be monitored during disposal, and operational changes implemented as necessary to comply with water quality criteria at the mixing zone boundary. Following completion of the Stage II berm, this material will be physically isolated from Commencement Bay.

Localized reductions in DO levels may occur as dredged sediments are deposited on the bottom of Slip 1. The DO reductions are likely to be most pronounced lower in the water column. Most of the research reported to date indicates that disposal-induced DO reductions are short-term phenomena and do not cause problems in estuarine systems. The DO will be monitored during Slip 1 disposal events, and operational changes implemented as necessary to comply with the EPA approved Water Certification criteria at the mixing zone boundary.

It is possible that water from Slip 1 could exchange with the Blair Waterway while the berm is open and material is being placed in Slip 1. The potential for water quality impacts during disposal of dredged material in the Slip 1 CDF is based on results of sediment draining tests,

which suggested the release of measured chemical constituents into the water column during disposal of Segments 3, 4 or 5 sediments is unlikely.

Excess capacity sediments from the Middle Waterway and the Duwamish Waterway were also tested to ensure that no adverse short-term water quality impacts would occur at the mixing zone boundary during disposal in Slip 1. As with the disposal of dredged material from Segment 5, water quality impacts as a result of excess capacity sediment disposal in Slip 1 will only be a concern while the berm is open. Once the berm is closed, the disposal site will be isolated from the Blair Waterway and the remainder of Commencement Bay.

Additionally, the Contractor is responsible for the preparation of a Spill Prevention, Control, and Countermeasures plan to be used for the duration of the project. This plan ensures that care would be taken to prevent any petroleum products, chemicals, or other toxic or deleterious materials from entering the water. Overall, construction of the Slip 1 CDF would produce only minor, localized and temporary impacts on water quality.

Although the Slip 1 berm will be closed prior to the fishery closure period (February 15, 2004), sediments disposed of in Slip 1 will remain accessible to listed species during the previous in-water construction cycle. This situation is not expected to adversely affect juvenile salmonids. Sub-adult and adult salmonids are highly mobile and would likely avoid Slip 1 during construction. For these reasons, allowing contaminated sediments disposed of in the Slip 1 CDF to remain exposed to tidal influence during project construction (August 16 through February 14) is expected to have a negligible effect on listed species.

#### *2.2.1.5 Construction of Slip 5 Habitat*

The Slip 5 habitat construction takes place in two phases. The first phase was the pre-load filling using clean structural materials during 2002/2003 (NOAA Fisheries ESA Consultation 2002/00943) up to minus 10 feet MLLW for the habitat and minus 9 feet for the protective berm. The second phase will complete the habitat structure using clean selected materials placed by bottom-dump and flat-decked barges using clam-shell buckets. The Slip 5 mitigation site would be constructed of material that is suitable for open-water disposal under the PSDDA program or beneficial reuse. Structural fill and rock used for mitigation site construction would be from clean upland sources.

Using recognized Puget Sound industry nearshore filling methods, suspended sediment concentrations are not expected to reach levels dangerous to salmonids, and any effects on water quality would be temporary. The Contractor will be responsible for modifying operations, especially relating to the scheduling of substrate placement during incoming or slack tides, to decrease the potential for water quality exceedances. Turbidity will be monitored during filling,

and operational changes implemented as necessary to comply with water quality criteria at the mixing zone boundary.

To compensate for the unavoidable loss of 2.62 acres of littoral habitat being converted to upland during the filling Slip 1, the Slip 5 mitigation element will convert 6.12 acres of subtidal habitat to littoral habitat. An additional 0.97 acre of existing littoral habitat within Slip 5 will be improved through changes in slope and substrate. In total, this mitigation would yield increases in quality of littoral habitat and provide habitats that reverse past cumulative losses in the bay. Overall, the activities in Slip 5 would yield an increase of 3.50 acres of littoral habitat within the action area. In addition to an increase in the acreage of littoral habitat, increases in habitat quality would occur due to the increase in fine-grained low gradient habitats in protected environments. In terms of juvenile salmonid feeding and refuge function, the mitigation habitat in Slip 5 is expected to be as much as an order of magnitude higher quality than the existing habitat in Slip 1 (Pacific International Engineering 2002a).

Habitat quality would improve in the action area because the acreage of littoral habitat with substrates other than riprap would be increased. When complete, the mitigation site will provide 3.04 acres of sandy and 2.52 acres of angular gravel substrate habitat. An additional 1.53 acres of littoral habitat will be riprap overlain with angular gravel and angular cobble (quarry spill). However, it is estimated that the smaller material on the exposed bayward bench and face of the reef will be disturbed to some degree by wave action. Therefore, half of this total (0.77 acre) is tallied as being riprap in the post-project condition. Further, the addition of ten LWD cover structures along the shoreline of Slip 5 will also improve the baseline conditions by increasing habitat complexity and promoting accretion of finer grained materials.

The combination of the gentle slope, fine substrates, and increased acreage and function at the Slip 5 mitigation site will increase epibenthic prey organism productivity and subsequently the habitat value for juvenile salmonid feeding and rearing. Epibenthic organisms would be eliminated within Slip 1 and disturbed in certain areas on the existing intertidal and shallow subtidal habitat within the Slip 5 mitigation site. However, new intertidal and shallow subtidal acreage on the face of the berm and the new intertidal and shallow subtidal acreage constructed as part of the Slip 5 mitigation actions will increase the acreage that will support epibenthic production. Based on monitoring of constructed mitigation habitats at Slip 5 (Jones and Stokes 1988, 1991a, 1991b) and the Milwaukee Habitat Area (Parametrix 1996, Pacific International Engineering and Parametrix 1998; Pacific International Engineering 1998b), it is expected that the new habitats will be rapidly colonized by epifauna.

Because construction would occur during a season when juvenile salmonids are present only in very low numbers, the habitat would have time to recolonize prior to the following spring outmigration season. As stated, the project will more than offset the reduction in productivity caused by the filling of Slip 1. The project and the associated mitigation (which is expected to be of much higher quality than the habitat affected) would result in an increase in the overall

production of epibenthic prey for salmonids within Commencement Bay compared to existing conditions. Overall, the filling of Slip 1 and the associated Slip 5 mitigation are expected to improve over the baseline condition for epibenthic prey availability.

### 2.2.2 Indirect Effects

Indirect effects are caused by or result from the proposed action, are later in time, and are reasonable to occur (50 CFR 402.02). Indirect effects may occur outside the area directly effected by the action. Indirect effects from this project are those impacts that would result from the future use of Slip 1 as a container terminal supporting shipping activities.

Upon completion as a confined disposal facility, Slip 1 will become a commercial development as part of the Northern Expansion of Port of Tacoma's Terminal 3/4. New shipping activities can further degrade habitat values for PS chinook. Increased ship arrivals, berthing, and departures at Slip 1 after it is filled may affect the physical habitat and rearing conditions of juvenile chinook and other salmonids in the vicinity due to the large ships generating abrupt current action. Ship propellers generate approximately 244,000 cubic feet per minute currents and bow thrusters on the modern larger class vessels generate roughly 114,000 cubic feet per minute currents (NOAA Fisheries 2001). Filling Slip 1 would increase the number of vessels entering Blair Waterway on their way to and from Terminal 3/4. An analysis conducted by the COE (Nelson 1999) indicates that ship wakes result from several mechanisms, and the resultant impact on shoreline habitats is affected by the nature of the slope substrate. The Port has stated that the normal operation of post-Panamax container ships at Terminal 3/4 would normally be sufficiently removed to reduce any wash disturbance (Pacific International Engineering 2002b) and performance criteria of the monitoring plan would require repair under the COE permit. The incremental increase in ship wakes from additional vessel traffic operating in Blair Waterway, therefore, is likely to be negligible, and is unlikely to be measurable. Further, because the slopes of Blair Waterway are protected by riprap they are resistant to erosion from normal ranges of ship wake and naturally generated waves. Within the balance of the action area, the effect on the adjacent shoreline of wakes generated by even the largest ships that may call at Terminal 3/4 is less than that of wind-generated waves.

Additional impacts from increased shipping might also include excessive levels of ambient noise and light, and water quality degradation from: (1) stormwater; (2) hull antifoulants (TBT); (3) fuel spills; and (4) discharges. Pollutants (oil, toxic chemicals, radioactive materials, carcinogens, mutagens, teratogens, or organic nutrient-laden water including sewage water) in a listed species' habitat can possibly cause take by harming fish. Water quality and quantity limitations are associated with triggering the onset of sublethal effects such as disease in previously infected salmonid populations. The onset of disease is thought to be exacerbated by the added stress of poor water quality and quantity conditions (NOAA Fisheries 1998c). Factors associated with urbanization, including pollutants, have been implicated in 58% of the declines and 9% of the extinctions among 417 surveyed stocks (NOAA Fisheries 1998d).

While U.S. regulations prohibit the anti-fouling agent TBT based paints on vessels less than 25meters in length and a maximum leaching rate of 4 micrograms/square centimeter/ day for vessels greater than 25 meters, these restrictions do not apply to foreign flagged ships calling on U.S. ports. Ninety percent of the ships that call at the Port have hulls painted with TBT. About 70% of the ships calling to the Port of Tacoma are foreign flagged vessels from about 30 different countries. Seven of these countries have some regulations regarding TBT but they are generally the same or less restrictive than the U.S. About 60% of the ships arriving at the Port of Tacoma are from countries that have no regulations on the use of TBT. It is estimated that two larger ships could release up to 1.14 kilograms a day based on the maximum leach rate, translating into a concentrations of the order of 0.1 to 0.5 parts per billion (ppb) in the Terminal 3/4 portion of the Blair Waterway. Tributyl tin is very toxic to marine organisms. Effects include: acute morbidity at 0.96 to 31 ppb in fish; from 0.33 to 1.03 ppb in some algae; and from 0.1 to 2.1 ppb in invertebrates. Tributyl tin can also cause growth effects or anatomical deformities at concentrations as low as 0.02 ppb in invertebrates (EPA 1997b). However, high levels may not be biologically available because of the potentially high rate of adsorption onto organic particles and into the sediments. NOAA Fisheries does not expect accumulations of TBT to reach levels that would adversely affect chinook. Also, the flushing of the Blair Waterway from wind and tides should keep the waterway relatively clean. Additional details are discussed in the Maersk Sealand Pier Extension Biological Opinion (NOAA Fisheries 2001).

Oil spills from increased bunkering activities of the larger ships presents further risks to chinook. In the past 10 years at least three bunkering mishaps have been documented within the action area. In 1992 and in 1993 two spills occurred in the Blair Waterway: the SUN ROSE spill was 850 gallons; the NOSAC FOREST spill was approximately 7,000 gallons. In 1998, the Russian vessel the ANADYR spilled approximately 5,000 gallons in the Sitcum Waterway. Because of the timing, the NOSAC FOREST spill was the worst spill, taking place during the juvenile chinook outmigration period. State biologists (Hooper 1993, pers. observ.) documented mortality and morbidity in White River spring chinook, at that time identified as a “critically depressed” stock (Wash. SASSI 1992). While spills are not intended, the result of increased shipping activity is an increased probability that a spill will occur. Improved bunkering standards developed by the U.S. Coast Guard and the Washington State Department of Ecology since the last spill could reduce this risk.

An additional indirect effect to PS chinook from increased shipping at Slip 1 might be an increase in the number of non-indigenous species in Commencement Bay. Such species have already been identified from infauna and epifauna collections in Commencement Bay. Species are transferred to new environments, either intentionally or unintentionally, by many vectors, including: ship hulls, suction bays, and anchors, where organisms may attach or become entangled; commercial products, whereby organisms are unknowingly transferred along with cargo; and through discharge of ships’ ballast water, which is necessary for safe ship operations. Ballast water may be taken on and discharged at the port of departure, in transit, and at one or more arrival ports (Moyle 1990, Committee on Ships’ Ballast Operations 1996). While no adverse ecological effects have yet been noted in Commencement Bay due to the presence of

these introduced organisms, the increase in the total volume of ballast water potentially discharged to Commencement Bay increases the risk of introduction of detrimental non-indigenous species.

## **2.3 Cumulative Effects**

Cumulative effects are defined as “those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation” (50 CFR 402.02). The project involves action within a portion of the Hylebos Waterway, which has been previously altered by dredging, filling and other anthropogenic activities. However, future Federal actions that will impact the action area, such as navigational dredging and other activities permitted under section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act, will be reviewed under separate section 7 consultations, and cannot be considered cumulative effects.

The Port of Tacoma has almost 40% of the land available on the U.S. West Coast for container development and is actively working at upgrading road systems and railways to enable cargo to move quickly in and out of the Port. The Port anticipates spending \$250 million in capital projects to accommodate larger ships, stimulate business growth, and to meet the Port’s public responsibility. Again, virtually every future action to develop or restore will require a COE permit, triggering NOAA Fisheries review, therefore, they cannot be considered as cumulative effects. The operation of the Port’s facility, once developed, however, will increase the number of truck and rail trips on existing roads and railroads. These are within the local or private actions that are considered to create potential cumulative effects. In this case, these uses are not expected to have any additional effect on the species of concern or their habitat.

The Port also typically retains responsibility for maintenance and repair requirements for the terminal facilities it constructs and leases, including pavement repair, building painting, roofing repair/replacement, rail and switch repair/replacement associated with intermodal yards, and fender system repair/maintenance associated with pier structures. These activities are necessary to maintain good operating condition, protect against normal wear and tear, and protect the piers from structural damage that can happen when the fender system is damaged. Fender system damage requires immediate repairs because fender systems protect the structural integrity of piers and ships. A compromised fender system poses potential risks to the pier, the ships that use the pier, and the longshoremen, Port employees, and the Port’s tenants active on the piers and ships. The fender systems must be repaired to maintain the terminal facility in a safe working conditions.

These terminal maintenance activities, whether they are Port or tenant initiated, will be conducted in a manner that ensures compliance with all applicable local, state, and Federal laws and regulations, and permits that are in place for the facility. Repair or maintenance that entails in-water work that is embodied within the project permits for the facility will be conducted

consistent with those approvals. These actions are not expected to have any additional effect on the species of concern or their habitat. In-water repair or maintenance work that is not embodied within the project permits and approvals would be conducted consistent with other applicable Federal, state or local requirements.

Other effects in the action area are those from restoration actions taking place as a part of Commencement Bay Natural Resource Damage Assessment pursuant to CERCLA (USFWS and NOAA, 1997; Kerwin 1999). Landscape and watershed scale restoration sites have also been identified to increase connectivity between important salmon habitat transition regions (Simenstad 2000). It is particularly difficult to detect, with confidence, the effects of habitat improvements based on observed run size trends. It has been estimated that, because of inherent variability, it would take 30 years to detect a 50% improvement in average production, if we were to use adult run size as the response variable (Lichatowich and Cramer 1979, Mobrand Biometrics 2001).

## **2.4 Conclusion**

Having evaluated the collective effects of the proposed action, the environmental baseline, and any cumulative effects, and taking into account measures for survival and recovery specific to the listed species' life stage, it is NOAA Fisheries Biological Opinion that the project will not jeopardize the continued existence of Puget Sound chinook. Of the 10 salmonid indicators to be affected by the project, five will be maintained, five (water quality, sediment quality, area-diversity- accessibility, shoreline modification, and benthic prey) will improve over baseline in the long-term, and one (benthic prey) will temporarily degrade (due to the short-term loss in productivity that would occur as a result of the projects temporary disturbance of littoral habitat) then return back to match baseline conditions. Based on the potential for benthic impacts, NOAA Fisheries agrees with the EPA's conclusion that the action could adversely affect listed fish at the point of project dredging, disposal, and capping, though the effects on PS chinook will be minimized by measures to avoid work in the juvenile salmonid migration period, and engineering controls.

Over the long term, removal of highly contaminated sediments is a beneficial aspect, improving over the baseline water quality condition. NOAA Fisheries also agrees with the EPA's conclusions that the remedial action will address risks to the environment and public health, reduce the levels of chemical constituents in sediment and thereby help improve and restore salmon habitat in Commencement Bay. In arriving at the non-jeopardy conclusion for this action, the minimization measures and the ultimate goal of clean sediment substrates which supports increased benthic diversity and productivity were important factors. While injury or death may unintentionally result during construction activities, more harm to PS chinook is likely to occur if the fish continue to be exposed to unremediated contamination if the nearshore environment during juvenile rearing and migration (*i.e.*, by not cleaning up the contaminated sediments under the proposed Action). NOAA Fisheries finds that through the adherence to the

project design objectives and conservation measures, likely potential negative effects of the actual construction activities are expected to be minimized or eliminated.

## **2.5 Reinitiation of Consultation**

This concludes formal consultation on this proposed action in accordance with 50 CFR 402.14(b)(1). The EPA must reinitiate this ESA consultation if: (1) new information reveals effects of the action that may affect listed species in a way not previously considered; (2) new information reveals the action causes an effect to listed species that was not previously considered; or (3) a new species is listed or critical habitat designated that may be affected by the identified actions. In instances where the amount or extent of authorized incidental take is exceeded, any operation causing such take must cease pending conclusion of the reinitiated consultation.

## **2.6 Incidental Take Statement**

Section 9 of the ESA prohibits take of endangered species. Federal regulations pursuant to Section 4(d) of the ESA prohibit the take of threatened species. “Take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect listed species, or to attempt to engage in any such conduct (50 CFR 222.102). “Harm” is further defined by regulation to include significant habitat modification or degradation that results in death or injury to a listed species by “significantly impairing essential behavioral patterns such as breeding, spawning, rearing, migrating, feeding, and sheltering” (50 CFR 222.102). “Harass” is defined as “an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns, which include, but are not limited to, breeding, feeding, and sheltering”(50 CFR 17.3).

“Incidental take” is take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), take that does not jeopardize the continued existence of the listed species, is incidental to and not intended as part of the agency action, and that is in compliance with the terms and conditions of the incidental take statement, is not considered prohibited take. An incidental take statement specifies the impact of any incidental taking on the endangered or threatened species, and provides reasonable and prudent measures that are necessary to minimize the impact. It also sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

### **2.6.1 Amount or Extent of Take Anticipated**

While the in-water dredging, capping, disposal, and habitat construction activities of this action are scheduled to occur during a period of time (July 16 - February 14) when few individuals of

the listed species are expected to be present, NOAA Fisheries anticipates that some unquantifiable incidental take of PS chinook is probable from the project activities. Despite the use of best available commercial and scientific data available, the highly variable presence and number of fish make quantification of take difficult and uncertain.

However, because take also includes harm caused by habitat modifications, the extent of habitat affected by an action can be a surrogate measure for take. In this action, the amount of habitat modification can be assigned based on the amount of change or activity in the littoral zone where juvenile chinook salmon can be found, if any are present during the time of the year when the construction occurs. Excavation (and dredging) in the littoral habitat in Segments 1, 3, and 4 above minus 10 feet MLLW amounts to about 2.9 acres. The capping footprint along the embankments is approximately 5.3 acres of the littoral habitat in Segments 4 and 5. The amount of new littoral habitat produced in the Slip 5 habitat construction is 7.1 acres.

In this action, juvenile chinook salmon can be expected to be taken throughout remediation efforts of the 15.3 acres of littoral habitat. Based on a surrogate measure for incidental take using modification of littoral habitat (minus 10 to plus 14 feet MLLW) by juvenile chinook salmon, any project element that deviates by:

- 1) more than 25% of the areas (2.9 acres total) to be excavated/dredged in Segments 1, 3, and 4; or
- 2) by more than 25% of the areas (5.3 acres total) to be capped in Segments 4 and 5; or
- 3) less than 7.0 acres created in the Slip 5 littoral habitat, as measured during the 2005 field monitoring season,

would exceed the authorized incidental take and require reinitiating the consultation.

Accordingly, the reasonable and prudent measures were developed to address the extent of habitat effects, as described below.

#### 2.6.2 Reasonable and Prudent Measures

The following reasonable and prudent measures (RPMs) are necessary and appropriate to minimize the take of PS chinook. The RPMs are integrated into the BA Addendum for the proposed project. NOAA Fisheries has included them here to provide further detail as to their implementation.

1. The EPA will minimize incidental take during dredging activities in Segments 3, 4, and 5.

2. The EPA will minimize incidental take during capping activities in Segments 4 and 5.
3. The EPA will minimize incidental take during disposal activities in Slip 1-
4. The EPA will minimize incidental take during habitat development activities in Slip 5.

### 2.6.3 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the EPA must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary:

1. To implement all reasonable and prudent measures, above, the EPA shall:
  - a) Include the terms and conditions identified herein as remedial requirements under CERCLA orders to the Port and OCC.
  - b) Comply with the in-water work window detailed in the Opinion, Table 1 when the chance of encountering chinook salmon is minimal.
  - c) Comply with all conservation measures appropriate for dredging from Section 14 of the BA Addendum.
2. To implement reasonable and prudent measure 2, the EPA shall, while capping, generally maintain littoral habitat area, slopes, and elevations. The waterward filling with 3 feet of capping material should be offset by excavation elsewhere, to the extent possible during final design changes.
3. To implement reasonable and prudent measure 3, the EPA shall:
  - a) Place only contaminated sediments in Slip 1 below an elevation of plus 9 feet MLLW.
  - b) Provide a fish recovery plan for the Slip 1 disposal area to reduce fish-trapping prior to closing the berm above intertidal water depths. If sampling indicates juvenile salmonids are present, some form of non-

contact herding using nets should be implemented following discussions with NOAA Fisheries.

- c) Initiate a contingency plan if the Slip 1 berm is not closed to above plus 14 feet MLLW by February 15, 2004. The plan will involve the sampling of the disposed materials using Puget Sound Dredge Disposal Authority protocols for the top 10 cm for the chemicals of concern. If the analytical concentrations are less than the EPA's Sediment Quality Objectives (SQO) criteria for Commencement Bay sediment cleanups, no further actions are required. However, if any one chemical is more than four times (4X) SQO values or if any two or more chemicals exceed twice (2X) the EPA SQOs, the entire disposal site will be capped with at least one foot of clean material (sand or 2-inch minus, round, pit-run "habitat mix").
4. To implement reasonable and prudent measure 4, the EPA shall:
- a) Maintain the structure and function of the Slip 5 Habitat in perpetuity.
  - b) Ensure that the Port of Tacoma implement a multi-year, integrated monitoring plan for the Slip 5 and Clear Creek Phase II habitats, as spelled out in the BA Addendum, Attachment F as well as in other Exhibits and Supplements provided to the Services (NOAA Fisheries and USFWS) and the Washington Department of Fish and Wildlife since 2000. The EPA will develop, in concert with the Port and OCC, a technical advisory group to provide advice and recommendations within the Contingency Plan and made part of the OMMP consisting of appropriate technical experts from the Services, as well as Tribes and other resource agencies.
  - c) Ensure that the Port of Tacoma conduct juvenile salmonid monitoring surveys at Slip 5 and Clear Creek Phase II, according to the monitoring plan (BA Addendum, Attachment F, Exhibit B). The EPA shall minimize direct take of salmon during sampling by: ensuring that sufficient qualified technicians are on-site to quickly process each net sample; minimizing the time that fish are entangled in the net; placing each fish in a container of surface water immediately after removal from the net; measuring fork lengths while fish are immersed in water; taking stomach contents by a non-lethal protocol (*i.e.*, lavage method), when necessary; releasing all fish immediately after processing; and observing the behavior of fish after release to confirm live release.

- d Complete CERCLA cleanup activities at Slip 5, and the associated Clear Creek Phase II, habitat projects designed to replace the habitat loss caused by the filling of Slip 1 and Hylebos Waterway by February 15, 2004, to avoid triggering a reinitiation of consultation. Delays in providing functioning replacement habitats may require an increase in acreage of habitat creation.

### **3.0 MAGNUSON-STEVENSON FISHERY CONSERVATION AND MANAGEMENT ACT**

#### **3.1 Background**

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (section 305(b)(2));
- NOAA Fisheries must provide conservation recommendations for any Federal or state action that would adversely affects EFH (section 305(b)(4)(A));
- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (§305(b)(4)(B)).

“Essential Fish Habitat” means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA section 3). For the purpose of interpreting this definition of EFH, waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species’ contribution to a healthy ecosystem; and “spawning, breeding, feeding, or growth to maturity” covers a species’ full life cycle (50 CFR 600.110). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or

reduction in species fecundity), site-specific or habitat-wide effects, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside EFH, such as upstream and upslope activities, that may have an adverse effect on EFH. Therefore, EFH consultation with NOAA Fisheries is required by Federal agencies regarding any activity that may adversely affect EFH, regardless of its location.

The objective of this EFH consultation is to determine whether the proposed action may adversely affect designated EFH, and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH resulting from the proposed action.

### **3.2 Identification of EFH**

Pursuant to the MSA the Pacific Fisheries Management Council (PFMC) has designated EFH for federally-managed fisheries within the waters of Washington, Oregon, and California. The designated EFH for groundfish and coastal pelagic species encompasses all waters from the mean high water line, and upriver extent of saltwater intrusion in river mouths, along the coasts of Washington, Oregon and California, seaward to the boundary of the U.S. exclusive economic zone (370.4 km) (PFMC 1998a, 1998b). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years) (PFMC 1999). In estuarine and marine areas, designated salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (370.4 kilometers) offshore of Washington, Oregon, and California north of Point Conception to the Canadian border.

Detailed descriptions and identifications of EFH are contained in the fishery management plans for groundfish (Casillas *et al.* 1998, PFMC 1998a), coastal pelagic species (PFMC 1998b), and Pacific salmon (PFMC 1999). Assessment of the effects to these species' EFH from the proposed action is based on these descriptions and information provided by the EPA.

### **3.3 Proposed Action**

The proposed action and action area are detailed above in Section 1 of this Opinion, are within the marine waters of Commencement Bay, and include habitats which have been designated as EFH for various life stages of 46 species of groundfish, four coastal pelagic species, and three species of Pacific salmon (Table 3).

Table 3. Species of fishes with designated EFH in the estuarine composite of Puget Sound.

<b>Groundfish Species</b>	redstripe rockfish <i>S. proriger</i>	Dover sole <i>Microstomus pacificus</i>
spiny dogfish <i>Squalus acanthias</i>	rosethorn rockfish <i>S. helvomaculatus</i>	English sole <i>Parophrys vetulus</i>
big skate <i>Raja binoculata</i>	rosy rockfish <i>S. rosaceus</i>	flathead sole <i>Hippoglossoides elassodon</i>
California skate <i>Raja inornata</i>	roughey rockfish <i>S. aleutianus</i>	petrale sole <i>Eopsetta jordani</i>
longnose skate <i>Raja rhina</i>	sharpchin rockfish <i>S. zacentrus</i>	rex sole <i>Glyptocephalus zachirus</i>
ratfish <i>Hydrolagus colliei</i>	splitnose rockfish <i>S. diploproa</i>	rock sole <i>Lepidopsetta bilineata</i>
Pacific cod <i>Gadus macrocephalus</i>	striptail rockfish <i>S. saxicola</i>	sand sole <i>Psettichthys melanostictus</i>
Pacific whiting (hake) <i>Merluccius productus</i>	tiger rockfish <i>S. nigrocinctus</i>	starry flounder <i>Platichthys stellatus</i>
black rockfish <i>Sebastes melanops</i>	vermilion rockfish <i>S. miniatus</i>	arrowtooth flounder <i>Atheresthes stomias</i>
bocaccio <i>S. paucispinis</i>	yelloweye rockfish <i>S. ruberrimus</i>	
brown rockfish <i>S. auriculatus</i>	yellowtail rockfish <i>S. flavidus</i>	<b>Coastal Pelagic Species</b>
canary rockfish <i>S. pinniger</i>	shortspine thornyhead <i>Sebastolobus alascanus</i>	anchovy <i>Engraulis mordax</i>
China rockfish <i>S. nebulosus</i>	cabezon <i>Scorpaenichthys marmoratus</i>	Pacific sardine <i>Sardinops sagax</i>
copper rockfish <i>S. caurinus</i>	lingcod <i>Ophiodon elongatus</i>	Pacific mackerel <i>Scomber japonicus</i>
darkblotch rockfish <i>S. crameri</i>	kelp greenling <i>Hexagrammos decagrammus</i>	market squid <i>Loligo opalescens</i>
greenstriped rockfish <i>S. elongatus</i>	sablefish <i>Anoplopoma fimbria</i>	<b>Pacific Salmon Species</b>
Pacific ocean perch <i>S. alutus</i>	Pacific sanddab <i>Citharichthys sordidus</i>	chinook salmon <i>Oncorhynchus tshawytscha</i>
quillback rockfish <i>S. maliger</i>	butter sole <i>Isopsetta isolepis</i>	coho salmon <i>O. kisutch</i>
redbanded rockfish <i>S. babcocki</i>	curlfin sole <i>Pleuronichthys decurrens</i>	Puget Sound pink salmon <i>O. gorbuscha</i>

### **3.4 Effects of Proposed Action**

As described in detail in section 2.2 of this document, the proposed action may result in detrimental short- and long-term effects to a variety of habitat parameters. These adverse effects are:

1. Short term degradation of benthic foraging habitat during dredging, capping, and habitat development activities.
2. Short term degradation of water quality (*e.g.*, elevated turbidity or the accidental release of contaminants including petroleum products, chemicals or deleterious materials) because of in-water construction activities.
3. Temporal delays during replacement of functioning subtidal habitat by enhanced intertidal habitats as part of habitat development.

### **3.5 Conclusion**

NOAA Fisheries believes that the proposed action may adversely impact the EFH for the groundfish, coastal pelagic, and Pacific salmon species listed in Table 3.

### **3.6 EFH Conservation Recommendations**

Pursuant to section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations to Federal agencies regarding actions that would adversely affect EFH. While the conservation measures that the EPA has built into this sediment cleanup and disposal project are generally applicable to EFH for the species listed in Table 3, NOAA Fisheries recommends the following measures to further minimize the potential adverse effects of the proposed project and conserve EFH:

1. To minimize the adverse effect of short-term degradation of benthic foraging habitat (adverse effect No.1), the EPA should:
  - a) While capping, generally maintain littoral habitat area, slopes, and elevations. The waterward filling with 3 feet of capping material should be offset by excavation elsewhere, to the extent possible during final design changes.
  - b) Maintain the structure and function of the Slip 5 Habitat in perpetuity.

2. To minimize the adverse effect of short-term degradation of water quality during in-water construction activities (adverse effect No. 2), the EPA should initiate a contingency plan if the Slip 1 berm is not closed to above plus 14 feet MLLW by February 15, 2004. The plan will involve the sampling of the disposed materials using Puget Sound Dredge Disposal Authority protocols for the top 10 cm for the chemicals of concern. If the analytical concentrations are less than the EPA's Sediment Quality Objectives (SQO) criteria for Commencement Bay sediment cleanups, no further actions are required. However, if any one chemical is more than four times (4X) SQO values or if any two or more chemicals exceed twice (2X) the EPA SQOs, the entire disposal site will be capped with at least one foot of clean material (sand or 2-inch minus, round, pit-run "habitat mix").
3. To minimize the adverse effect of delays in replacing functioning habitats (adverse effect No.3), the EPA should
  - a) Maintain the structure and function of the Slip 5 Habitat in perpetuity.
  - b) Complete CERCLA cleanup activities at Slip 5, and the associated Clear Creek Phase II, habitat projects designed to replace the habitat loss caused by the filling of Slip 1 and Hylebos Waterway by February 15, 2004, to avoid triggering a reinitiation of consultation. Delays in providing functioning replacement habitats may require an increase in acreage of habitat creation.

### **3.7 Statutory Response Requirement**

Please note that the MSA and 50 CFR 600.920(j) require the Federal agency to provide a written response to NOAA Fisheries' EFH conservation recommendations within 30 days of its receipt of this letter. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse effects of the activity. In the case of a response that is inconsistent with the EFH Conservation Recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

### **3.8 Supplemental Consultation**

The EPA must reinitiate EFH consultation with NOAA Fisheries if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920(l)).

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**APPENDIX I**

*In-Water Construction Monitoring Report  
Johnson Bridge Replacement (2002/01227)*

*Start Date:* \_\_\_\_\_

*End Date:* \_\_\_\_\_

*Waterway: Touchet River, Walla Walla County*

*Construction Activities:*

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*Number of fish observed:* \_\_\_\_\_

*Number of salmonid juveniles observed (what kind?):* \_\_\_\_\_

*Number of salmonid adults observed (what kind?):* \_\_\_\_\_

*What were fish observed doing prior to construction?* \_\_\_\_\_

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*What did the fish do during and after construction?* \_\_\_\_\_

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*Number of fish stranded as a result of this activity:* \_\_\_\_\_

*How long were the fish stranded before they were captured and released to flowing water?*

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*Number of fish that were killed during this activity:* \_\_\_\_\_

***Send report to:***

*National Marine Fisheries Service, Attention Diane Driscoll, Washington State Habitat Branch, 510 Desmond Dr. SE, Suite 103, Lacey, WA 98503*

